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David Laidler

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ALTERNATIVE EXPLANATIONS AND POLICIES TOWARDS INFLATION: TESTS ON DATA DRAWN FROM SIX COUNTRIES

by

David Laidler

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I

Inflation has been the most widely discussed economic problem of the last decade. It has been a problem for all western countries to a greater or lesser extent, and there has been a wide divergence of views about its causes and about the appropriate means whereby it might be cured. Different views about causation inevitably lead to different policy prescriptions and particularly in the last three years, policies towards inflation have taken divergent paths. Divergent policies have not been in force for long enough for it to be possible to come to any firm conclusions about their relative long run effectiveness though it is increasingly coming to seem as though countries which have adopted the traditional policies of monetary stringency are having the most success in dealing with inflation. Those countries whose policy makers have relied on new tools specially devised for what they took to be a new type of inflation, and perhaps of a type unique to their own countries, seem to have had less success.

The purpose of this paper is to investigate aspects of the competing views on inflation that have underlain these competing policies to see whether empirical evidence is capable of distinguishing between them. It begins with an account of these views, here called sociological, monetarist and eclectic, and derives from them certain testable predictions which are then subjected to tests against data from a variety of countries. Though the results are not definitive, they are strongly in favour of a monetarist interpretation of inflation, particularly when it is confronted with a sociological approach. The eclectic who wishes to stress that different factors nevertheless are of different significance in different economies will be able to find some limited

support for his views in the results presented below, but he will also find that for each economy studied his eclecticism will nevertheless have to be built on a solid foundation of essentially monetarist theory.

The evidence in favour of a basically monetarist interpretation of the evidence for all the countries studied is strong and, of course, there already exists a good deal of evidence from other work that points in the same direction.[1] Thus, in the final section of this paper the implications of monetarist analysis for policy both as it has been conducted in the past and as it might be conducted in the future are discussed, first from the point of view of predicting the likely outcome of recent policy actions and second from the point of view of the problems that must arise in the longer run if monetarist analysis of the problem of inflation is indeed broadly accurate.

II

Any classification of views about the causes of inflation must be to some extent arbitrary, and yet, if empirical evidence is to be used in a systematic fashion to distinguish between those views that are compatible with experience and those that are not, some such taxonomy must be attempted. It is helpful to divide explanations of inflation into three broad groupings: sociological, monetarist and eclectic. All three schools of thought are concerned to provide an explanation of the time path of the general price level in recent years.[2] It is well known that since about 1966 onwards virtually every country in the western world has seen an acceleration of its inflation rate. Thus, there are two questions to be answered: why have prices begun to rise more rapidly? and why has this happened more or less simultaneously in a number of countries?

The sociological view of the inflationary process puts these events down to rising and, as between different groups, inconsistent expectations about real living standards. Such expectations generate social unrest and, in particular, increasingly 'militant' attitudes on the part of the labour force. Hence they produce upward pressure on money wages. Employers, both in the private and public sector, have become increasingly unable, or unwilling, to resist this pressure. This reluctance to resist wages demands is in turn put down to the growing concentration and integration of industry which has led to a marked increase in the power of the strike weapon, a power further compounded by the commitment of governments to full employment policies. As to the international character of inflation, this is explained by "demonstration effects" being transmitted across national boundaries with increasing ease, modern communications media having made the international transmission of ideas and of news about particular events more and more efficient. Upward pressure on money wages leads to upward pressure on prices and variations in the aggregate demand for goods and services and hence for labour are seen as having no effect on the rate of inflation, at least within the ranges of those variables that it is politically possible to maintain. In short, inflation is determined outside the market mechanism. Wages and prices are to be viewed as exogenous variables in any economic analysis of the aggregate economy. Thus inflation is best combatted by resort to one form or another of direct controls on wages and prices.[3]

The monetarist view of inflation stands in sharp contrast to the sociological explanation. It begins with the elementary, but all too often overlooked fact, that the general price level is simply the inverse of the price of money relative to goods and the basis of the monetarist explanation of inflation is supply and demand analysis. Now this approach to the explanation

of inflation has a history that is centuries long, but modern monetarist analysis has advanced far beyond the simple partial equilibrium approach to price level determination implicit in, say, Pigou's classic (1917) paper. The behaviour of the supply and demand for money is a vital part of the analysis, but nevertheless only a part, for the following reasons.

It is now recognized that the behaviour of arguments in the demand for money function other than the price level, for example real income or wealth and nominal interest rates, is unlikely to be always and completely independent of the supply of money's time path; that money is most unlikely to be neutral even in the long run, let alone the short run.[4] Although the monetarist explanation of inflation looks to variations in the rate of monetary expansion to explain variations in the inflation rate, it nevertheless postulates an indirect and potentially drawn out transmission mechanism as being an integral part of the inflationary process. The mechanism in question has two distinct steps in it, the first between monetary changes and aggregate demand and the second between aggregate demand and the inflation rate. It is moreover recognized that variations in the inflation rate themselves feed back and influence aggregate demand so that the linkages between the two stages in the transmission process are complicated and by no means unidirectional. The upshot of all this is that the monetarist approach leads one to the conclusion that monetary expansion rates and inflation rates will only be loosely correlated except in long run averages of data, even though monetary expansion is the prime or even the sole cause of inflation.

That the quantity of money does indeed have an important role to play in influencing aggregate demand is by now widely recognized, but the nature of the link between aggregate demand and inflation is more open to dispute.[5] The monetarist, in common with many economists who would resist the label,

postulates the existence of an 'expectations augmented Phillips curve' which makes the current rate of price inflation depend upon the expected rate of price inflation--usually but not necessarily with a unit coefficient--and some measure of excess demand. Thus, in sharp contrast to the sociologist, the monetarist views inflation as very much a matter of traditional economic forces.

The monetarist approach to the international character of inflation is straightforward but, although firmly grounded in traditional economics, does differentiate the monetarist view of inflation from other economic explanations of the phenomenon in a way that adherence to the expectations augmented Phillips curve does not. It notes that, until 1971, the major countries of the world were linked to one another by fixed exchange rates between more or less convertible currencies; thus the relevant 'economy' in which the supply and demand for money might be expected to interact in order to determine the price level is the world economy and not that of any individual nation state. The problem for the monetarist's explanation of inflation in the international sphere is not to understand why inflation rates in different countries have moved roughly in harmony with one another, but to understand instead why the harmony has been only imperfect.[6] It is differences between national inflation rates that a monetarist must explain, while the sociologist must explain similarities.

Just as the sociological approach implies particular policies so does the monetarist view. If inflation is to be controlled in one national economy then a policy of monetary stringency must be adopted in combination with one of exchange rate flexibility.

The above account of the monetarist position leaves some loose ends to be tied up later but we will now turn to the so-called 'eclectic' approach to

explaining inflation. The approach is based on the seductively plausible proposition that anything as complex as inflation must have complex causes, and that there is no reason to suppose that, as a particular inflationary episode progresses, each cause will be of equal importance in explaining the behaviour of prices at each moment. Thus the principal impulse to inflation in one country in a particular year can be coming from monetary expansion, but the next year it may be the militancy of trade unions that is giving the major impetus towards rising prices in that same country.

Nor, according to an eclectic, is there any reason to suppose that the factors causing inflation at any time should have equal weight in different countries. In short the very nature of an eclectic approach to the problem of explaining inflation precludes the possibility of anyone providing any brief and remotely accurate summary of its salient characteristics. The same may be said of the policy approach implicit in this view. Sole reliance on any one policy tool is unlikely to be successful. What is required is a mixture of policies to deal with the complex mixture of causes that underlie the inflationary process.

How then are we to discriminate between these different views of the causes of recent inflation? The first thing that needs to be said is that the facts of the recent inflation, since say 1966, can only be of the most limited use in testing them. The reason for this is straightforward. If an explanation of any set of facts is put together in knowledge of those facts, then its degree of compatibility with those facts will tell us something about the logical capacity of those who constructed the explanation but nothing about the explanation's validity. To illustrate from another area:- to be taken seriously, any theory of the consumption function must explain the well known discrepancy between time series and cross section data on the marginal

propensity to consume but its merits as a theory of the consumption function must be judged by its ability to explain other phenomena that were not taken into account in its construction. In just the same way, if an explanation of inflation was constructed explicitly to deal with recent evidence, then that same evidence cannot be used to test it.

This elementary methodological point leads us into difficulties with some aspects of both the 'sociological' and 'eclectic' approaches to inflation. There is a strong tendency among their proponents to claim that since some time in the late 1960's we have seen a "new inflation" unlike those experienced in the past. But this means that data drawn from earlier periods cannot be used to test these views. If there has indeed been a 'new inflation' since, shall we say, 1966 then incompatibility of evidence drawn from before that year with a theory advanced to explain the data generated since may even be used as evidence in <u>favour</u> of the 'newness' of recent experience.[7] The same may be said of using data from different countries to confront an hypothesis about inflation. If a theory tells us to regard the recent experience of any country as unique to that country, explanations of that experience cannot be tested with data drawn from other countries.

In short, there is among the proponents of the sociological view of inflation, a proclivity towards a non-scientific approach to social questions. Hence it is difficult to submit their views to scientific processes of assessment, or at least to do so in a way that they would be likely to find acceptable. When two explanations of a particular set of events are offered, and it is impossible to discriminate between those two explanations on the basis of observing that particular set of events, then if one explanation is more capable than the other of dealing with other observations, it is usually judged superior on the grounds of greater generality. The 'new inflation'

theories are open to assessment in terms of this criterion. They are not supposed to be capable of dealing with data drawn from earlier periods--e.g., the 1950's and early 1960's; however monetarists claim to provide a general theory of the behaviour of the price level. If a monetarist explanation deals as well with more recent observations as with earlier ones, then it is a better explanation of recent events. The principle that one should abandon a theory and adopt an ad hoc explanation of a particular group of observations only if that theory cannot deal with the observations in question will underlie my treatment of "new inflation" theories in this paper. However I recognize only too clearly that some of their proponents will not find this acceptable.

A related methodological problem arises with regard to certain aspects of the "eclectic" approach to inflation. Its proponents argue that the price level is influenced by several exogenous variables but that the amount of influence to be accorded to any particular exogenous variable differs significantly from time to time and place to place. This could be for two reasons. It could be because the structure of the relationships between the exogenous variables and the price level is unstable, or it could be that, though the structure remains stable, the amount of variation in the relevant exogenous variables differs from time to time and place to place. If the latter view is taken then there is no problem in testing an "eclectic" view of inflation--though it might in fact be difficult to distinguish it from some forms of monetarist theory; as we shall argue a monetarist view by no means requires that the quantity of money be the sole variable to be included in an equation determining the behaviour of the price level.[8] However, to say that there is no stable structure determining the behaviour of the price level is to say that its behaviour cannot be predicted, but merely described ex post. There is no way of submitting such a view to test, unless evidence that there does exist

some stable structure that explains the behaviour of the inflation rate is regarded as refuting it.

The discussion of the last few pages has necessarily been rather general in nature, but we can now turn to give a more specific account of the precise nature of the hypotheses at stake in the empirical work described in this paper. First the work in question has been confined to explaining national price inflation rates. This choice of dependent variable might seem so obvious as hardly to need discussion, but there are two alternatives which might have been chosen. First, a great deal, indeed perhaps the majority, of empirical work on inflation that has been carried out in post war years has dealt with explaining the rate of money wage inflation on the, usually implicit, assumption that, if wage inflation is explained, then so is price inflation. This view stems from orthodox post Keynesian macro-economics, where the price level is determined by the behaviour of an exogenously given money wage rate, and in and of itself presupposes a particular view of the inflationary process that ought to be tested. Moreover we are worried about inflation as a policy problem because of its disruptive social effects. These hinge upon the income and wealth redistribution, and the damage to the market economy as a form of social organization, that arise from fluctuations in the value of money. This is not to say that the behaviour of money wages is an uninteresting problem for study, or to say that their behaviour is unrelated to price level behaviour, but it is to argue that it is the price level whose behaviour ought to be the main focus of inflation theory.

The second possible alternative to a national price level as a variable to be explained is some measure of the price level ruling in the world economy. The monetarist view of inflation sketched earlier would certainly lead one to conclude that the behaviour of such a variable is worth explaining in its own

right. However, we are here involved in comparing different views of inflation; sociologists and eclectics are concerned with understanding the behaviour of national price levels, and would probably regard a world price level as being no more than an average of price levels in individual national economies, and not, as would a monetarist, an interesting variable in its own right. Thus, if the monetarist view is to be compared with these alternatives, the comparison must be carried out in terms of its capacity to explain the behaviour of national price levels. Moreover, to the extent that inflation is a political problem, it is a political problem for national governments. Our ability to explain national inflation rates is thus of considerable practical importance.

The variable whose behaviour is to be explained then is the national price level. What factors do our competing approaches suggest ought to be associated with variations in it? And what other associations between variables do they suggest ought also to be observed? Equally important, what variables do they tell us ought not to be associated with one another? Let us consider the sociological approach first of all. It views inflation as the outcome of social unrest that stems from competition over shares in real income. It frequently focusses on the power of the strike as a means of generating increases in money wages, which in turn feed into increases in prices. Moreover, real income aspirations are transmitted across national boundaries by demonstration effects, as are the militant attitudes underlying the use of the strike weapon. Within politically possible ranges, variations in the level of excess demand, and hence in the unemployment rate, have no effect on inflation.

What does all this tell us we should expect to observe? Should we expect, if the strike weapon has become more powerful, to see it being used more and producing more rapid inflation, or to see it being used more sparingly? It

does, after all, take two sides to have dispute that leads to a strike, and, if strike activity has become more damaging, then, though one might expect unions to be more willing to threaten a strike, one also might expect to see employers more willing to concede wage claims without a strike actually having to materialize. Though it is not clear what we ought to expect to observe, a number of writers have postulated that strike activity should be positively associated with inflation, and none has predicted that an inverse relationship ought to hold.[9] Thus perhaps we should regard a positive relationship between inflation and strike activity as being consistent with a sociological view of the causes of inflation. Certainly increasing strike activity is evidence of increasing social conflict, and a positive relationship between inflation and strike activity can be rationalized in these broader terms.[10]

As to demonstration effects carrying across national boundaries, there is also some difficulty in deciding what we ought to observe, particularly if such activity is evidence of social unrest. I suggest that if demonstration effects are important we should observe a positive correlation between strike activity in different countries. Such an association ought to be closer for countries between which communications are easy, by virtue of free labour mobility between them, or perhaps by virtue of a common language, than between more widely separated countries. One thing that one ought not to be able to observe, if the sociological view of inflation is a complete explanation of inflation in and of itself, is any association between an excess demand measure and the rate of inflation. This ought to have been particularly so since the mid-1960's, when the 'new inflation' was supposed to have begun.[11]

The monetarist approach to inflation has of course already been widely studied from an empirical point of view. It is increasingly accepted that inability to find a 'stable' demand for money function would constitute a

refutation of this position. However, the existence of such a relationship for a wide variety of countries and time periods is one of the best established facts in the literature of applied economics. Moreover, we noted earlier, in sketching out the monetarist view, that when applied to open economies, it suggests that the inflation rate is determined on a worldwide basis, rather than country by country. A necessary condition for this aspect of the monetarist position to be true is the existence of a stable demand for money function at the level of the worldwide aggregate economy. Again, this is a proposition that has been confronted with data and which has survived the test.[12] All this suggests that, vitally relevant though it is to the monetarist position, it is hardly worthwhile to test yet again the demand for money function as part of the work embodied in this paper and I shall not do so.

In any event, I have argued elsewhere that, when the variable to be explained is the inflation rate in a particular economy, the monetarist position implies that one should be testing hypotheses about the transmission of inflation from the world economy to the particular economy as well as hypotheses about the causation of inflation on a worldwide basis. It also implies that one should be particularly concerned to formulate and test explanations of the deviation of national inflation rates from the worldwide trend. It is on the transmission process that I shall concentrate in the work that follows, and on the causes of deviations of the national from the world inflation rate.[13] I do this because work currently being carried out by others is dealing with explaining the generation of the inflation rate in terms of world aggregate data, and not because I do not regard work on that problem as vital to the testing of the monetarist position.[14]

Within a monetarist framework, it is possible to identify at least two alternative views as to how inflationary impulses are transmitted between

economies.[15] The first of these is the traditional price specie flow mechanism whereby domestically generated monetary expansion in any one country at a rate faster than that necessary to maintain its inflation rate at a value consistent with those ruling abroad leads to a balance of payments deficit, a corresponding surplus elsewhere and hence faster monetary expansion elsewhere. In other economies the acceleration in monetary expansion coming through the balance of payments leads to excess demand and ultimately to a higher inflation rate. In the end each country ends up again with a higher inflation rate, and the country that initially experienced an increase in its rate of monetary expansion from domestic sources finds itself with a balance of payments deficit that persists for just so long as the higher domestic credit expansion rate persists. The key characteristic of this view is that it has monetary flows between countries being an active force in transmitting inflationary impulses. It treats the proximate cause of changes in the inflation rate in any one country as changes in domestic excess demand brought about by changes in the rate of monetary expansion, regardless of whether the source of such variations in monetary expansion are themselves domestic or foreign.

An alternative to this view may be referred to as the 'price transfer mechanism'. The distinguishing characteristic of this view is that it sees flows of reserves between countries playing an accommodating rather than a causative role in the transmission of inflationary impulses. The theory in question is grounded, loosely, as is any macro hypothesis in the current state of knowledge, in the 'new microeconomic' theories of price setting behaviour. It starts from the proposition that an important determinant of the price setting behaviour of the individual firm is its expectations about the pricing behaviour that is going to be followed by firms producing related products. For a firm in an open economy producing output which can be arbitraged across

national boundaries, the markets for which prices have to be set are not just domestic but potentially worldwide; moreover, there is no reason to suppose that all firms producing closely related products for sale on a worldwide basis will be located in the same country. Thus, the expectations about other firms' pricing behaviour that feed into the pricing decision of the individual firm are thought of as being based on observations made at the level of the world market and not of the domestic market.

In aggregate, the behaviour of the overall price level in an open economy will be heavily influenced by expectations formed in this way. This influence may be captured by making the domestic inflation rate depend proximately on an 'expected inflation rate' which is to be thought of as an average of expected rates of change of the money prices of all those individual goods and services that make up domestic income. Many of these individual expectations are in turn to be thought of as being based on observations taken from world markets. Of course excess demand for goods also influences the domestic inflation rate according to this view of matters, but it is a variable that produces deviations from a trend dominated by expectations derived from the behaviour of a worldwise price level.[16]

In terms of this price transfer mechanism for inflationary impulses, a domestically generated increase in the rate of monetary expansion in one economy might indeed produce excess demand there, and an acceleration in the domestic inflation rate, to say nothing of an increase in the balance of payments deficit. There is nothing here to distinguish the price transfer and price specie flow mechanisms. However, the way in which the rest of the world imports the inflation differs between the two approaches. The price transfer approach has firms in other countries revise upwards their pricing plans in view of their observations that inflation is accelerating elsewhere,

independently of the current state of domestic excess demand for their output. The balance of payments surplus of those countries importing inflation generates an increase in their rate of monetary expansion, to be sure, but this merely validates the behaviour of their price level, and in no sense causes it to occur.[17] As we shall see, potentially important policy issues hinge on this point. Moreover there already exists a study which seeks to distinguish between these two views of the transmission process. The evidence of that study is overwhelmingly in favour of the 'price transfer mechanism'. It shows the inflation rate in the rest of the world having an important role to play as a proximate determinant of the domestic inflation rate in nineteen individual countries studied.[18]

Now the price transfer mechanism is an adaptation of the 'expectations augmented Phillips Curve' to the explanation of pricing behaviour in an open economy. The key modification to the usual analysis is the hypothesis that inflationary expectations are influenced not just by domestic inflationary experience but by worldwide inflationary experience. Though the expectations augmented Phillips Curve has nothing to say about the role of money in influencing aggregate demand, and though there are many who would subscribe to it without wishing thereby to classify themselves as 'monetarists', it has, nevertheless come to acquire a central position in the monetarist approach to the theory of inflation. The evidence cited here is thus consistent with a monetarist explanation of inflation. However, long before the term 'monetarist' was used in the context of the theory of inflation, a good deal of empirical work on the problem laid stress upon the influence of import prices on domestic prices in an open economy. In the context of the old 'demand-pull cost-push' dichotomy import price inflation was looked upon as a 'cost-push' factor in the generation of inflation.[19] It is inconceivable that in a period of

worldwide inflation there should not be a reasonably close correlation between a measure of the 'world price level' on the one hand and a price index of a particular country's imports on the other. This consideration immediately raises the possibility that the results reported above merely reflect the influence of import prices on domestic inflation. Since the work which generated them also found domestic excess demand usually to have a significant influence on the inflation rate, it could be interpreted as showing that both demand-pull and cost-push factors are important in determining inflation, and that import prices are a significant cost-push variable. This suggests that it is worthwhile to try to distinguish between the role of world prices in general, and import prices in particular, as determinants of the domestic inflation rate. Though it would be possible to construct a model which might by some be termed 'monetarist' in which import prices played a special role in the international transmission of inflation, such a model would be further from the spirit of contemporary monetarist analysis than one which puts weight upon the importance of inflationary expectations. The discovery that import prices had a special role to play would tend to tip the debate in favour of an 'eclectic' view of inflation, albeit one still grounded in economics as opposed to sociology. Hence this question is investigated in the empirical work which follows as a means of distinguishing between the monetarist and eclectic positions.

It has already been pointed out that the very nature of the eclectic viewpoint can prevent any sharply defined test of its truth or falsity, particularly when it is based on the proposition that the structure of the economy is inherently unstable and changeable. However, it has been noted that one aspect of eclecticism simply says that the determinants of inflation are multiple and that, stable though the structure of the economic system

may be, different causes are of different importance at different times and places. This is a proposition that can be investigated, and certain exercises which we shall carry out in our empirical work will investigate the relative importance of different variables as proximate determinants of the inflation rate.

One matter remains to be discussed before we turn to reporting substantive results and that is the choice of countries to be studied. They are Britain, Italy, the Federal Republic of Germany, Japan, Switzerland and the United States. There are particular reasons for choosing this group of countries. The first five of them are relatively open medium sized economies for which, if the monetarist view of inflation is correct, there ought to be a common model of the generation of price level changes. On the other hand, an eclectic view of inflation stresses the possibility that different variables have different degrees of importance at different times and places. If there is justification for this view then we ought to find important differences, at least quantitative, and perhaps qualitative, between the models that explain the inflationary experiences of these first five countries. The countries in question have been selected to enhance the chances of this occurring, for there are many differences among them.

To begin with, throughout recent experience Germany and Switzerland have had inflation rates somewhat lower than the other three. Italy has long been regarded as having one of the more militant labour forces in the industrialized world, while the British labour force has acquired a similar reputation more recently.[20] Germany, Switzerland and Japan on the other hand would usually be judged as having much more disciplined labour forces. Germany and Italy, as founder members of the EEC, have in recent years shared many economic institutions, and in particular participate in a common labour market. If

demonstration effects are important in the international transmission of inflation, one would expect them to be particularly strong between these two countries. The geographic and linguistic proximity of Switzerland to both of them should also lead to strong demonstration effects between them. Britain, though geographically close to Continental Europe, remained outside the EEC during the period of this study, while Japan is relatively separated from these four countries by culture and language, as well as by geography. If there are sociological demonstration effects between countries, one would surely expect them to be relatively weak as between Japan and those others.

The United States is not, of course, a small, or even medium sized economy, nor is it very open. It is included in this study for three reasons. First, it has had relatively close ties with both Japan and Europe since the second world war, and hence might conceivably have influenced both by way of demonstration effects. Second a monetary explanation of inflation would lead us to expect that internal and external factors ought to have different weights in determining the inflation rate in the United States as compared with in the other four countries. United States data hence provide us with an extra way in which an explanation can be tested. Finally, the United States has been more closely studied than any other economy, and if the techniques used in this particular study generate results for the United States that are markedly out of line with those of other studies, this ought to lead us to doubt the validity of the results achieved for the other countries in the study. Hence the United States provides us with some check on the overall validity of the results we generate for other countries.

III

I will now discuss some tests of the alternative views of inflation that have been outlined in the preceding section of this paper. First, I will take the sociological and monetarist views separately and see how far one can get with them in explaining the data from the countries selected. When dealing with the monetarist position, I will also attempt to discriminate between the role of import prices on the one hand, and expected world prices on the other, in determining the domestic inflation rate and thus produce results relevant to an "eclectic" view of inflation. Then I will discuss the relative performance of the first two views and consider the extent to which they might both have something to contribute to an 'eclectic' explanation of inflation.

Let us first of all consider the 'sociological' approach. As I have formulated it, it would appear to make three basic predictions. First, that there should be observable systematic relationships between some measure of strike activity on the one hand and the domestic price inflation rate on the other. Second, there should be no systematic relationship between an excess demand measure and inflation once the influence of strike activity is allowed for. Third, if the inter-country transmission mechanism of inflation involves a demonstration effect, we should expect to observe a correlation between countries in the level of strike activity, particularly between those countries that are close to each other,either geographically or culturally.

Obviously we need a measure of strike activity in order to subject these hypotheses to test, and three such measures are available: the number of strikes in any year, the number of workers involved in strikes in any year, and finally the number of man days lost in strikes in any year. As Ward and Zis (1974) have shown, these three measures are correlated with one another, but

not all that closely. One of them, namely the number of disputes, automatically drops out in the present context because data on it are not available for Germany, so our choice is effectively between the number of workers involved in disputes and the number of man days lost. Inasmuch as it is reasonable to suggest that the intensity of any particular dispute, and its social importance, will be reflected both in the number of people involved in it and the length of time it lasts, I have decided to use the latter measure in the work that follows. Obviously the amount of weight that the reader might wish to attribute to the results achieved will be dependent on how appropriate he thinks this choice to have been.

The second variable required is an excess demand proxy. In earlier work I have used the log. of the ratio of actual real income to trend real income, and that is the variable used here. It is, as the reader will recognize, a ratio measure of what is often referred to as the 'GNP gap'. This variable has performed well in other studies and there is no reason to suppose a priori that it will perform any worse in this one. Data for these two variables, and for national inflation rates, are available on an annual basis for, and enable us to study, the period 1954-1973.[21] There are, of course, relatively few observations here for any one country, but since one test that it might be appropriate to carry out on any fitted relationship is to see how well it forecasts ahead of the sample of data to which it is fitted, I have in fact used the years 1954-1970 in estimating the equations reported below.

Where ΔP is the price inflation rate, y is the excess demand proxy, and S is the number of man days lost in disputes, the first equation fitted to data from our six countries is of the following form

$$\Delta P = a_o + a_1 y_{-1} + a_2 S_{-1} \qquad (1)$$

I have permitted an intercept to appear in this relationship. Because I have suppressed the intercept in other studies and will do so below in other equations, it is worth explaining why this is not done here. The decision stems from the belief that, even if social conflict were the sole source of inflation, and even if variations in strike activity were a perfect proxy for variations in the intensity of conflict, a zero inflation rate would nevertheless be associated with some positive level of strike activity. Thus, if anything, one would expect the intercept of the above relationship to be negative.

Finally, note that the above equation posits a one year time lag between excess demand and strike activity on the one hand and the inflation rate on the other. As far as excess demand is concerned this time lag was imposed on the basis of evidence from earlier studies and its appropriateness was not subjected to any test. However, experiments with contemporaneous strike activity were also carried out--though their results are not reported here simply to economize on space--to ensure that nothing crucial in the results depends upon the particular time pattern of response imposed upon the equation fitted; in fact nothing does.[22]

The salient characteristics of the results presented in Table 1 are easily summarized. The coefficient of the excess demand proxy variable is significantly positive for every country, as is the intercept of the relationship for every country except the United States. The strike variable is significantly positive only for Italy though marginally so for the US and the UK. For Germany, Switzerland and Japan the variable would appear to have no role to play at all. What we have here in short is a set of results that tells us that deviations of the inflation rate from an unexplained constant positive value are systematically related to excess demand for every country studied, and to strike activity for, at most, three of them. An eclectic might take

some comfort from these results but there is not much in them for a sociologist. The importance of excess demand is strong evidence against the proposition that market forces have not been important in determining the time path of the inflation over the period covered. However, it would appear that 'militancy' and 'social conflict' have been potentially important contributors to inflation in, at best, three countries.

This last conclusion can be tested further. Militancy is supposed to work through its effect first on wages and through wages on prices. Thus, for those three countries where the strike variable bears a systematic relationship to price inflation, it ought to be even more closely related to the wage inflation rate. Further work shows this to be the case. Results for a simple wage inflation equation using unemployment as a proxy for the excess demand for labour and the same measure of strike activity as that already utilized are presented in Table 2, except for Switzerland where the absence of an unemployment variable prevented this test being carried out. In this case it turns out that the time pattern imposed in the equation is important. Except for Italy the results in Table 2 are for an unlagged relationship of the form

$$\Delta W = b_o + b_1 U + b_2 S \qquad (2)$$

For Italy both independent variables are lagged one period.

Germany and Japan still produce results that show no positive effect of strike activity on the inflation rate, but for the other three countries the coefficient relating wage inflation to strike activity is better determined than that linking strike activity to price inflation. That is what one would expect if militancy or social conflict had their effects on price inflation through wage inflation. One other characteristic of the results reported in Table 2 should be noted, namely the lack of significance of unemployment--the

excess demand for labour proxy--as far as the UK, Germany and Italy are concerned. As Table 3 shows, with the results for Italy again being lagged, the excess demand for goods as measured by y is more closely related to the rate of wage inflation than is unemployment; for Switzerland the variable is but marginally significant. Thus Tables 2 and 3 do give us reason to suppose that wage inflation is in fact influenced by excess demand.[23]

What about the international transmission of inflation? Table 4 speaks for itself. In five out of six cases rates of price inflation between our countries are positively correlated with one another, strongly so in most cases, as are rates of wage inflation--the high correlations between Italy, Germany and Switzerland here being particularly noticeable in the light of my earlier remarks about them sharing in a common labour market. However, the correlations among strike activity in the five countries are more frequently negative than positive. Nor does it make any difference to the overall impression of these results if one permits lags to appear between countries, or alters the data period, as results not reported here show.

To sum up then, the sociological explanation of inflation comes rather badly out of the simple tests just reported. Excess demand turns out to be systematically related to wage and price inflation rates in all six countries studied.[24] There is a significant positive trend in each country's price level that is not explained by excess demand or by strike activity. Moreover, the correlations among strike activity measures in various countries are systematically lower than those among wage inflation or price inflation rates. On the basis of such results it would be easier to argue that inflation was the means whereby militancy was transmitted between countries than <u>vice versa</u>. Nevertheless, strike activity does appear to have had a systematic influence on inflation for Italy, the UK and the US. We cannot yet rule out the possibility

that the sociological approach to the explanation of inflation has an element of truth to it. That surely would be an eclectic's interpretation of the results reported here. We will take this issue up again below, but for the moment let us turn to testing the monetarist approach to the problem of explaining inflation.

As I remarked earlier there are two components to a monetarist view of inflation in a world of fixed exchange rates. First comes the matter of the determination of the "world" inflation rate and second the matter of the transmission of that world inflation rate to a particular national economy. In this paper, for reasons already discussed, I am dealing with the second of these issues. An earlier paper (Cross and Laidler 1975) presented empirical results about a particular hypothesis on the mechanism whereby the world inflation rate influences national inflation rates and in this section of the present paper I will start from those results and attempt to carry the argument further forward.

The key postulate is that the inflation rate in any one country is determined proximately by an expectations augmented Phillips type relationship of the form

$$\Delta P = gy_{-1} + X_{-1} \tag{3}$$

where X is the 'expected inflation rate'. For a closed economy it might be reasonable to think of this expected inflation rate being solely a function of past values of the domestic inflation rate, but, Cross and Laidler argued that for a fixed exchange rate open economy it was more reasonable to suppose that the inflation rate in the rest of the world also affected expectations. Specifically the following hypothesis about the determination of expectations was formulated and tested where $\Delta\Pi$ is the world inflation rate measured as a

national income weighted average of consumer price inflation in 19 other countries.

$$X-X_{-1} = d[v(\Delta P-X_{-1}) + (1-v)(\Delta \Pi - X_{-1})] \quad (4)$$

As can be seen, this is a form of error learning whereby expectations of inflation are corrected by a weighted average of the deviation of the domestic and world inflation rates from the overall expected inflation rate. The two foregoing equations when combined yield

$$\Delta P = gy_{-1} - g(1-d)y_{-2} + [1-d(1-v)]\Delta P_{-1} + d(1-v)\Delta \Pi_{-1} \quad (5)$$

or equivalently

$$\Delta^2 P = gy_{-1} - g(1-d)y_{-2} + d(1-v)[\Delta \Pi_{-1} - \Delta P_{-1}] \quad (6)$$

where the a priori expectations about parameter values are that

$$g > 0 \qquad 0 < d \leq 1 \qquad 0 \leq v \leq 1$$

This reduced form was estimated by Cross and Laidler, with all the constraints on its parameter values implied above imposed, for 19 countries and proved overwhelmingly superior to an alternative hypothesis that treated domestic inflation as having solely domestic determinants. Moreover, for many countries--including three of those included in this study--world inflation seemed totally to dominate domestic inflation as far as the formation of expectations was concerned.

In Table 5, results of recomputing the Cross-Laidler regressions for our six countries with marginally different data are presented.[25] These do not differ qualitatively from those generated by the earlier work.[26] This section of the present paper reports the consequences of subjecting this model to further tests along two lines of enquiry. First, a number of

constraints are imposed in generating the results presented in Table 5. It is worth asking whether the data satisfy those constraints. Second, it is worth asking whether the influence of world prices, which comes through so strongly here, does not have an alternative and simpler explanation to that advanced, namely that our variable $\Delta\Pi$ simply stands as a proxy for import price inflation with the latter having what used to be called a 'cost-push' influence on domestic prices. We will deal with these issues in turn.

Three constraints, or groups of constraints, were imposed in generating the results under discussion. First, restrictions as to sign and magnitude were imposed on the parameters g, d and v. Second, the coefficient of the expected rate of inflation X_{-1} in equation 3 was assumed and constrained to be equal to unity. Finally, the intercept of the regression equation was constrained to zero because expectations and excess demand are, between them, thought of as providing a complete explanation of inflation and not simply an explanation of variations in the inflation rate about some unexplained trend value. The reader will see that if equation 6 is estimated by unconstrained least squares, it will produce identical parameter estimates to those presented in Table 5 if the first group of constraints is satisfied. In Table 6 the reduced form parameters of equation 6 implied by the structural parameter estimates given in Table 5 are compared with estimates obtained by actually fitting equation 6. The results speak for themselves. For three out of the six cases the estimates are identical, implying that the constraints are completely satisfied, while for Italy, Germany and Switzerland we have the slightly weaker result that we are unable to reject the hypothesis that the constraints are satisfied. In computing the results given in Table 6, the intercept of the regression fitted was constrained to zero--implying no unexplained trend rate of acceleration in the inflation rate. It is worth noting that when the

equation in question was re-estimated freely, the intercept did not differ significantly from zero in any case, thus confirming that this procedure was appropriate.

The second constraint imposed in generating both Tables 5 and 6 is that the coefficient of X in equation 3 is unity, an important constraint because its imposition amounts to assuming that the 'natural unemployment rate' hypothesis is true. However, this constraint implies that if equation 5 is freely estimated, the coefficients on ΔP_{-1} and $\Delta \Pi_{-1}$ will sum to unity. Table 7 presents freely estimated results, and as the reader will see, the constraint is never violated, though in the case of Japan the sum in question takes a value that might be thought a little too high for comfort.

The final constraint imposed on the foregoing estimates was that there be no unexplained trend in prices, that the intercept in equation 5 actually be zero. Table 8 presents the results of relaxing this constraint. Here, the intercept is significantly positive in the cases of Germany and Italy, the same two countries that provided us with minor problems earlier on, and also for Switzerland, though for Germany and Switzerland the intercept in question is numerically quite small, much smaller than that in Table 1. The intercept is not significantly different from zero in the other three cases, but its presence does reduce the size and significance of the coefficients on the lagged domestic and lagged world inflation terms. This characteristic of the results presented in Table 8 is very much what one would expect if there was a strong trend in the price level for all the countries studied, as indeed there is, a trend which was potentially explicable in terms of the effect of expectations of inflation on the current inflation rate. To this extent our results support the expectations excess demand explanation of inflation, but not definitely so. The constraint that there should be no unexplained trend

in prices, that the intercept in Table 8 should not differ from zero is violated in three cases. The monetarist model performs better than the sociological one in terms of minimizing the size of the unexplained trend in prices but its performance could still be improved upon.

One ought not, however, to be too surprised at these results. Cross and Laidler (1974) concluded that the results they generated with the model being further investigated here gave strong reason to believe that the behaviour of world prices was an important proximate determinant of the behaviour of domestic prices; they also concluded, however, that those same results gave reason to believe that the model in question had not been altogether successful in specifying the precise means whereby this influence transmitted itself. The new results presented here are quite consistent with that conclusion and interpretable as telling us that our understanding of the processes whereby expectations of inflation are formed in open economies is as yet somewhat defective.

We will find further evidence consistent with this view presented below, but for the moment let us turn to investigating the question as to whether the world inflation rate variable in the foregoing regressions is not simply picking up the much simpler influence of import price inflation on domestic inflation. To do this an import price inflation variable ΔQ was substituted for a world inflation variable in equations 5 and 6. The results obtained, not all of which are tabulated here in order to save space, were strongly, though not universally in favour of the expectations hypothesis. Only in the case of the United Kingdom did the import price inflation variable consistently show more explanatory power than the world inflation variable, but the superiority here was marginal. In the cases of Germany, Switzerland and Japan, import price inflation appeared to be of no significance in explaining domestic price inflation; the parameter v went to unity in these cases when a fully constrained

version of equation 5 was fitted. Only when all constraints were removed and an intercept permitted to appear did the substitution of import price inflation for world inflation provide an equation of superior explanatory power in cases other than the United Kingdom. A comparison of Table 9 with 8 shows that this occurs in two instances. However, the substitution of ΔQ for $\Delta \Pi$ generates a significantly positive intercept in five out of six cases and a marginally significant one in the sixth--the U.S. If we wished to insist that import price inflation is the route whereby world-wide influences impinge upon domestic inflation, we would also have to accept that its role is to explain deviations from an otherwise unexplained trend and not to explain that trend. In any event the evidence presented in Tables 5-9, and that discussed above strongly suggests that it is through expectations rather than through import prices that world inflation influences the inflation rate in an open economy. Not only does the world inflation variable come closer to explaining the trend in inflation, than do import prices, but it also usually seems to add more explanatory power to the type of equation under test here.[27] The proposition that import price inflation is an important 'cost-push' element in an eclectic account of the generation of inflation in an open economy thus gets scant support from these results.

So far we have tested sociological and monetarist explanations of national inflation rates against what might be termed 'absolute' criteria. We have found that an extreme sociological explanation of inflation is refuted by the appearance of a well determined and systematic influence of excess demand on the inflation rate. It is also notable that, even in those cases in which strike activity might seem to have something to contribute to the explanation of inflation, it is deviations of the inflation rate from an unexplained trend that it deals with. Moreover we had no success in tracking down a cross-country demonstration effect. The tests of the monetarist theory

are on balance more satisfactory in their outcome. The constraints on coefficients implied by theory have usually though not always been satisfied by the data while the victory of an inflationary expectations hypothesis of the influence of world inflation on domestic inflation over an import price hypothesis is reasonably clear-cut.

The tests we have carried out so far do not end matters though. A theory that is obviously in need of improvement may still be acceptable if it is the best of those available. We have here two hypotheses, both of which are in some need of improvement but it is still worthwhile to ask which of these two is the better hypothesis, to compare the results presented in Table 1 with those set out in table 5. This comparison is more straightforward than might seem at first sight, for each table presents regression results that involve estimating three parameters.

The residual sum squares generated by the two equations give no real basis for choice between them. On this criterion equation 1 is indeed marginally superior to equation 5 in every case save the U.S. but the U.S. is one of the three cases for which strike activity looked important. For the U.K. the margin is an extremely thin one, resting on a 4th decimal place. Only for Italy and Switzerland does equation 1 look clearly better on this criterion. On the other hand the overall trend of prices for each economy except the U.S. is mainly explained by equation 5 in terms of the influence of world inflation on domestic inflation expectations while it is left unexplained by equation 1. I would regard this point of comparison as somewhat more important than the error sum squares criterion, not to mention the poor performance of the strike activity variable in three cases. Hence on the basis of the evidence presented here I would regard the monetarist explanation as the more satisfactory of the two. However, it would not be surprising to find that advocates of the

sociological approach disagreed about this. Such potential disagreement should not detain us, for the predictive power of the two equations over data drawn from beyond the original sample period may also be used as a basis for further comparison and the monetarist approach has a clear-cut victory here.

Before actually discussing the substance of the results in question it is worth digressing to discuss the appropriateness of extrapolating either of the two relationships at stake beyond the sample period. As we have already noted, there is a strong body of opinion that suggests that the power of the strike weapon has increased recently. If that is the case, one might not expect a relationship between inflation and strike activity that ruled in the 1950's and 1960's to explain much about the early 1970's. My own views on what is and is not a testable explanation of inflation have already been set out above and there is no need to repeat them here. Suffice it to say that in the absence of a clearly specified postulate about how we ought to expect the relationship in question to change in the 1970's, I would not accept an objection to my procedure along these lines.

What about the monetarist equation? We dropped observations for years when exchange rates changed from its estimation over the period 1954-1970 because it seemed <u>a priori</u> implausible that a rise in world prices expressed in domestic currency that arose from a once and for all devaluation under a regime of fixed exchange rates would affect expectations of inflation in the same way as an increase in world prices measured in foreign currency with the exchange rate constant.[28] In 1971 there was a major realignment of currencies which turned out to be merely the prelude to the adoption of a system of more or less floating exchange rates under which there have been frequent and indeed sometimes continuing changes in parities. Should we expect our fixed exchange

rate results to extrapolate to a regime of more flexible rates? There seems to me to be reason to suppose that they might though there is no logical necessity that they should.

It is one thing to say that once a devaluation under a fixed exchange rate regime happens, it is unlikely to generate an expectation that it will be repeated immediately, and quite another to say that once an exchange rate begins to fall under a regime of flexible rates that this will not generate expectations that the fall will continue, particularly among those who are not specialized foreign exchange dealers. It is possible therefore that results obtained for a period of fixed exchange rates will extrapolate to a period of flexible rates. Indeed, if economic agents form their expectations about the behaviour of the exchange rate under such a regime with the same adaptive expectations mechanism that they apply to forming expectations about the inflation rate in the rest of the world, extrapolation ought to be possible. Thus, in using the parameter estimates presented in Table 5 to forecast forward for the years 1971-1973, we are testing two propositions: first that the relationship originally estimated is robust, and second that, under a flexible exchange rate regime, expectations about the inflation rate in world markets in terms of domestic currency are influenced by current observations of that rate of inflation in the same way, whether those observations result from inflation of foreign currency prices on the one hand or a falling exchange rate on the other.

Charts 1-12 present a comparison of the actual with the predicted time path of the inflation rate for each country studied, the predictions in the first six charts being based on the strike hypothesis embodied in the parameter estimates reported in Table 1, and those in the second six coming from the parameter estimates in Table 5. These charts speak for themselves. The first

six all show a marked deterioration in predictive power as soon as the sample period is left, this being as true for those countries in which strike activity appeared to have some predictive power over the inflation rate in the years up to 1970 as for those where it did not. Either we agree that the years since 1970 have seen a 'new inflation' or we regard the sociological approach to the explanation of inflation as being further undermined by these results.

The results for the monetarist equation charted in figures 7-12 are somewhat better. Strike activity took a positive coefficient for three countries, the U.S., the U.K., and Italy, and so it is particularly noteworthy that in each of these cases the strike activity equation fails to forecast ahead of the sample as well as its monetarist rival. It fails in the other three cases as well but this is hardly surprising.[29] However, though the monetarist equation clearly forecasts better than its rival, it is still far from satisfactory. It does forecast well enough for the United States, but for other countries shows a systematic tendency to underpredict inflation after 1970 and particularly for 1973--the exception here being Germany.[30]

One point about the results presented in Charts 7-12 particularly for the period up to 1970 is well worth noting. When we break down the predicted value of the inflation rate to show separately the contribution of inflationary expectations, captured in the terms $(1-d)(1-v)\Delta P_{-1} + d(1-v)\Delta\Pi$ and domestic excess demand, captured in the terms $gy_{-1} - g(1-d)y_{-2}$, it is clear that the overall trend in the inflation rate is dominated by expectations, with excess demand largely accounting for deviations from this trend. Since for every country except the United States, expectations are dominated by world wide trends, completely so in the case of Italy, Germany and Switzerland, these results provide strong confirmation of the monetarist view that, under a system of fixed exchange rates, it is sensible to regard the overall trend value of

inflation as being set at the level of the world economy with domestic variables accounting for the deviation of national inflation rates from this world wide trend. As far as a more flexible rate regime is concerned the results are ambiguous. Our hypothesis would have suggested that exchange rate variations could either cancel out these world wide influences or magnify them, depending on the direction of change of the exchange rate, so that flexible exchange rates confer upon domestic policy makers a power over domestic inflation that they do not possess under a fixed exchange rate regime. However, the poor extrapolative performance of our equations particularly for the relatively 'open' economies puts us in no position to come to any hard and fast conclusion on this issue. This is an issue to which we will return below, when the policy implications of the results presented here are discussed. For the moment, one more set of empirical results is worth presenting.

Up till now we have been comparing one equation with another and asking which is the better of the two, but of course an eclectic view of the matter would suggest that there is no particular reason to suppose that either the sociologist or the monetarist has a monopoly of the truth when it comes to dealing with the explanation of inflation. In terms of the work currently under discussion he might suggest that strike activity, expectations, and excess demand were complementary in the explanation of inflation. If we modify equation 5 so that it includes a strike activity variable, lagged one year to be consistent with the way in which it was included in equation 1, we get

$$\Delta P = gy_{-1} + X_{-1} + bS_{-1} \tag{7}$$

and with X defined as it was above, this expression then implies

$$\Delta P = gy_{-1} - g(1-d)y_{-2} + [1-d(1-v)]\Delta P_{-1} + d(1-v)\Delta\Pi_{-1} + bS_{-1} - b(1-d)S_{-2} \tag{8}$$

The results of fitting it, with all constraints imposed are presented in Table 10, and these results are of some interest. First, as compared with Table 5, the introduction of a strike variable makes no difference to the importance of excess demand as an explanatory variable. Moreover, it makes little difference to our estimate of v and hence to the extent to which we judge a particular economy to be open to outside influence through an inflationary expectations mechanism.

The inclusion of strikes does influence our estimates of d to some extent, increasing and improving the apparent precision of the estimate of this parameter in the case of Japan, but lowering and reducing the apparent precision of the estimate in the case of Italy. Nevertheless, if strike activity is important as a proximate determinant of the inflation rate, it would appear to play its role mainly in addition to rather than instead of those variables regarded as important by a monetarist. Comparison of Table 10 with Table 1, on the other hand, shows that monetarist variables, particularly those associated with expectations of inflation, do make an important difference to our assessment of the importance of strike variables. For Germany and Switzerland strike activity remains of no importance, while for the United States the introduction of inflationary expectations pushes it out of the picture entirely. As to Italy and the United Kingdom, the significance of strike activity as an influence on inflation is placed in some doubt by Table 10. The coefficient of the variable is still positive but its statistical significance is reduced as compared with Table 1. Japan provides an exception to this general tendency for the apparent importance of strike activity to be reduced by considering its role at the same time as that of inflationary expectations. The variable takes a positive coefficient and is marginally significant in Table 10, whereas it was negative, albeit insignificantly so in Table 1. However, work not reported

here shows that inclusion of this variable actually reduces our ability to forecast ahead for 1971-1973 in the case of Japan so too much should not be read into this.

All in all, there is some comfort for a monetarist in the results set out in Table 10. They do show that, when excess demand, inflationary expectations and strike activity appear together in a regression equation, the influence of excess demand on inflation comes through strongly, that the influence of inflationary expectations is just as discernible as it is in the absence of strike activity, but that the influence of strike activity gets downgraded in four cases out of five. A monetarist might suggest, on the basis of these results that strike activity is to some extent correlated with inflationary expectations and perhaps partly to be explained by them. An eclectic could of course argue on the basis of these same results that strike activity cannot be discounted as a possible autonomous influence on inflation in some countries, but he would have to concede that the variable could be accorded only a relatively minor role. Only for the U.K. does the inclusion of this variable improve our ability to forecast ahead of the sample period, and then only marginally so.

Let us now summarize the results that have been presented so far. First and foremost, the role of excess demand as a proximate determinant of inflation is strongly supported by all the results presented. Regardless of the other variables in the regression, and regardless of the country under consideration, excess demand has come through strongly. This is powerful evidence against the view that market forces have no role to play in explaining inflation in the modern world. Our proxy variable for non-market influences on inflation was strike activity, even though we did note that there are potentially serious objections to so interpreting such a variable. Its contribution

to explaining inflation turned out to be dependent upon the other variables included in a particular equation, and upon the particular country studied. Moreover, though strike activity did seem to have been potentially important for three countries for the period up to 1970, it was not possible satisfactorily to forecast ahead from this date on the basis of pre-existing relationships. This means either that sociological forces were more important in influencing inflation in the 1950's and 1960's than they have been since, hardly a view that most advocates of the sociological approach would accept, or that the nature of their influence has changed in the last few years, or that the correlations observed for earlier periods should not be interpreted as evidence of causation. I prefer the third of these explanations, particularly in the absence of any inter-country correlation of strike activity and particularly in view of the fact that, even at the best of times, excess demand and strike activity appeared to leave a strongly determined trend in prices to be explained, or rather not to be explained, by an intercept.

Excess demand does, of course, have a strong role to play in a monetarist explanation of inflation, but another variable of importance in this case is inflationary expectations, expectations formed moreover partly on the basis of observations of inflation rates in the rest of the world. The expectations variable did not perform as consistently well as excess demand, but it did prove a decisively superior alternative to strike activity; for one thing unexplained trends in prices are much less prone to turn up in the presence of this variable, and for another it seems to be important for all the countries studied and not just a sub-set of them. The rest of the world's inflation rate also performed better than import price inflation adding further confidence to our belief in the importance of expectations. Thus, the monetarist explanation of inflation performs better than the sociological one, while an attempt

to add strike activity to a monetarist equation turns out to contribute only marginally to our ability to explain inflation. In short these results do not suggest that eclecticism has much to add to a monetarist explanation of inflation.[31]

This being said, however, the monetarist equation we have tested certainly leaves room for improvement. It has already been noted in an earlier paper (Cross and Laidler 1975) that the way in which expectations are incorporated into this equation probably leaves something to be desired. The difficulties encountered in forecasting ahead into a period of flexible exchange rates only serve to confirm this conclusion and I conjecture that further work, which certainly needs carrying out, will show that expectations about the behaviour of the exchange rate need to be treated separately from expectations of world price inflation, when trying to capture the influence of world wide factors on domestic inflation.

IV

The empirical results generated in the previous section of this paper are hardly definitive, but they do point towards an economic as opposed to a sociological view of the inflationary process. Moreover, expectations variables seem to dominate excess demand variables as proximate determinants of the inflation rate even though the latter are consistently statistically significant. At the outset of this paper we argued that a sociological view of inflation, or an eclectic view with strong sociological content, was usually associated with advocacy of wage-price controls as a major ingredient of anti-inflation policy. Thus one might regard the case for such policies as having been undermined by our empirical results. However, it has also been argued, notably by Phelps (1972) that if expectations play an important role in the inflationary process, there is a case to be made for wage and price

controls, namely that such controls can reduce inflationary expectations, and in doing so can lower the inflation rate independently of the state of aggregate demand. Now there is nothing unique about wage and price controls in this respect. The widely publicized adoption of any anti-inflationary policy measure that the general public believes will be successful will influence expectations in just the same way. However, the question remains as to whether or not wage and price controls do in fact have such an effect. Of the six countries which we have studied here, two, the United States and the United Kingdom, resorted to such measures during the period under investigation while the other four did not.[32] We can perhaps get some idea as to whether such measures were effective by comparing the actual time path of inflation during the time when they were in force with that predicted by the expectations excess demand equation whose estimation completely ignored any possibility of such extraneous influences on expectations.

Consider the United Kingdom results first of all. Inspection of figure 10 shows that the equation in question performs well up to 1966 but then begins to go astray. It seriously overpredicts the inflation rate between 1966 and 1967, and thereafter systematically underpredicts it. It is not without significance that a statutory wage and price freeze was introduced in the United Kingdom in July 1966, was only slightly relaxed in the succeeding twelve months, and was rapidly and progressively relaxed for the following two years, being finally given up in 1969. The data charted in figure 10 strongly suggest that introduction of this freeze had an initial effect of lowering the inflation rate below the level that might otherwise have prevailed, but that whatever gains might have been achieved at first were quickly lost in subsequent years as the inflation rate 'caught up' with its underlying trend, this 'catch up' tendency being compounded perhaps by the once and for all effects on the price level of

the November 1967 devaluation of Sterling. Since the end of this particular episode of wage and price controls saw the inflation rate considerably higher than at its inception, and, moreover accelerating, these controls can hardly be termed successful. Britain experimented further with statutory controls, beginning in November 1972 with yet another complete freeze. The adoption of such policies coincided with a rapid acceleration in the inflation rate, one which has continued ever since, and it is difficult to claim even initial short term success for this second experiment.

This second British experiment was closely modelled on the wage-price control program begun in the United States in August 1971. The latter policies were widely regarded in Britain as being successful, and, indeed, as in the case of Britain in 1966-1967, figure 7 shows a sharp fall in the U.S. inflation rate below its predicted value between 1971 and 1972 but rapid reversal of this movement in the following year. Again, we seem to have signs of initial success followed by failure in the longer term just as we have for Britain in the late 1960's.[33] This is what one would expect if wage and price controls did indeed affect inflationary expectations. For a given time path of nominal aggregate demand, a policy that, through its effects on expectations lowers the inflation rate below what it otherwise would have been, must also ensure that the level of excess demand in the economy will be greater than it otherwise would have been. It thus sows the seeds of an eventual increase in the inflation rate. Only if aggregate demand is managed in such a way as to prevent excess demand developing when the inflation rate is brought down by wage and price controls can there be any chance of obtaining anything more than temporary benefits from them.[34] Moreover, the experience of Britain since 1972 suggests that even temporary benefits are unavailable when a policy of wage and price controls is tried a second time. These controls were seen to fail over the 1966-1969 period and it is plausible

to argue that as a result the introduction of a new set of regulations in 1972 did not lead to any downward revision of inflationary expectations and hence did not have any effect on the actual inflation rate either.

If the analysis of inflation consistent with the evidence presented in this paper gives little support to wage and price controls as effective tools of anti-inflation policy, it also casts considerable doubt upon the extent to which any individual country can use domestic demand management policies to regulate its own inflation rate independently of that ruling in the rest of the world; at least for so long as it also attempts to maintain a fixed exchange rate. This follows immediately from the way in which (as inspection of figures 7-12 will confirm) inflationary expectations dominate the long run trend of the inflation rate in all the countries we have studied, and from the way in which, in all countries save the United States, the formation of expectations is dominated by the inflationary experience of the rest of the world. This domination is total in the cases of Germany, Italy and Switzerland, if the results presented in Tables 5 and 10 are taken at face value. Except for the United States, which our results, plausibly enough, suggest is a rather 'closed' economy as far as the influence of world prices on domestic inflation is concerned, variations in domestic aggregate demand can only have a relatively minor impact on domestic inflation in both the short and the long term.

Now it is, of course, a well known implication of monetarist analysis of the long-run properties of open economies operating fixed exchange rates that their inflation rates cannot perpetually differ from that ruling in the rest of the world. If a country's inflation rate does differ from that ruling elsewhere the cumulative effect of payments imbalances on foreign exchange reserves must eventually force either a change of the exchange rate or the adoption of policies compatible with those being pursued elsewhere. However,

it was widely believed in the 1950's and 1960's that central banks' powers of sterilization enabled them to render the behaviour of the domestic money supply independent of the state of the balance of payments for significant periods of time, periods that were to be measured in years rather than months. Thus, it was believed that a country that did not wish to import a bout of inflation from the rest of the world could keep it out for a worthwhile period by permitting exchange reserves to accumulate while pursuing a relatively tight monetary policy.

No one ever believed that such a policy could have permanent effects and it was widely recognized that international capital mobility placed severe limits on the time period over which it could be pursued. The implementation of a relatively tight monetary policy in one country inevitably produces an interest rate differential in its favour that in turn leads to a capital inflow. This in turn places further upward pressure on reserves. There is no question but that international mobility of capital increased greatly in the 1960's and made it much more difficult for particular countries to pursue independent monetary policies. In the light of this it is perhaps not surprising that the two important surplus countries of our six, Germany and Switzerland both resorted, the former somewhat earlier, to a variety of measures to control inflows of foreign capital.[35]

The data in Table 11 show no clear cut or long term effects of these controls on the rate of monetary expansion--though the shortlived fall in the German monetary expansion rate during 1971/72 might owe something to them. However, the results reported in this paper strongly imply that such measures, even had they been successful in controlling monetary expansion, would have had relatively little effect on the inflation rates of those two countries. The ability to insulate its money supply from the balance of payments would only

other countries.[37] Domestically generated variations in the inflation rate in any one overseas economy could have only a trivial effect on the United States inflation rate but variations in the United States inflation rate would seem to have had a far from negligible effect on the inflation rate in other countries.

Given that the government of the United States pursued the fiscal and monetary policies that it did in the 1950's and 1960's and given a commitment to maintain a fixed exchange rate the long run behaviour of the inflation rate in other countries was dictated to them. This was all well and good for as long as the United States itself maintained reasonable price stability. Even in the cases of Britain a continual pursuit of extremely high employment targets with fiscal policies coupled with a policy of interest rate stabilization that inevitably produced a close correlation between domestic credit expansion and the government borrowing requirement, resulted not in an inflation rate that deviated far from that ruling elsewhere, but in a secularly growing balance of payments problem--a problem which culminated in the forced devaluation of November 1967. This diagnosis of the problem leads immediately to the conclusion that the acceleration of inflation that took place throughout the world in the late 1960's was a direct result of the United States fiscal and monetary policies that accompanied the intensification of the Vietnam war, and that it was, in the case of Britain, exacerbated by the 1967 devaluation.

Up till 1971 the rest of the world was unable to avoid importing inflation from the United States, and indeed it is not clear that certain countries--again notably Britain whose reliance of wage and price controls after 1966 was premised on the belief that inflation was being generated domestically by 'cost-push' forces--knew that they were importing inflation. Germany and Switzerland, on the other hand with their imposition of restrictions on capital

give a fixed exchange rate economy the power to choose its own inflation rate if the proximate determinants of domestic inflation were themselves domestic; if, in short, what we have above termed the price specie flow mechanism were the means whereby inflationary impulses are transmitted between countries. If instead, as our results so strongly indicate, a more direct price transfer mechanism is at work in which foreign inflation rates dominate domestic expectations, then the domestic inflation can only be maintained below that ruling in the rest of the world for as long as the domestic economy is run at less than capacity output.[36]

I would conjecture, and this is a point that surely would be worthwhile to investigate further, that this matter had as much to do with the failure of German and Swiss attempts to insulate themselves from an accelerating world inflation after 1968 as did the more usually blamed factor of increased capital mobility. If this conjecture is correct, then controls on capital movements, or even separate, and perhaps flexible, exchange rates for capital account transactions, are no substitute for exchange rate flexibility on the trade account when it comes to insulating an open economy from inflationary impulses originating abroad.

We have talked here about inflation originating abroad being a dominant factor in the inflation rates of every economy save the United States. Given the exchange rate regime in force in the 1950's and 1960's there was considerable asymmetry in the relationships between the United States and the rest of the world as far as the generation of inflation was concerned. This asymmetry arose not just from the dominant position of the United States as the source of the world's major reserve currency--a matter which has and is being analysed by others and hence is relatively ignored in this paper--but also from the very size of the United States' economy relative to those of

inflows did show more signs of having known what was happening. However, under the strain of different countries trying to combat inflation by different means, the system of fixed exchange rates began to come apart in 1971 and we now find ourselves with a system of so called 'dirty floating'. In terms of the monetarist model of the international transmission mechanism of inflation tested in the foregoing sections of this paper, the adoption of exchange rate flexibility can be thought of as giving to the domestic authorities the power over the extent to which inflation in the rest of the world influences domestic expectations. It does this because it is the rate of inflation measured in terms of domestic currency that influences domestic price setting, and a flexible rate permits the effects of inflation in the rest of the world to be offset by an appreciating currency, and vice versa. This at least is the case in theory, but the forecasting ability of our monetarist equation over the years 1971-1973 certainly suggests that this is an hypothesis that needs a great deal more investigations and refinement.

Certain implications flow from the foregoing argument, implications for which there are as yet insufficient data to provide a test. The abandonment of a commitment to fixed exchange rates has given to national governments greater freedom of action in the choice of policies towards inflation, but given widely accepted assessments of the length of the time lags inherent in the use of demand management policies--two years or more in the case of monetary policy--1974 is the first year in which one would really expect to observe the consequences of divergent policies resulting in divergences in national inflation rates that can be expected to persist. Whether these differences do in fact persist is something that can only be observed in the future. As we can see from Table 10 Switzerland and West Germany began to reduce their rates of monetary expansion substantially in 1972, the former a little earlier than the

latter. The United Kingdom slowed down a little in 1972 while Japan let its rate of monetary expansion accelerate until mid-1973. After mid-1973 both countries began to reduce their monetary expansion rates savagely. The United States began its contraction sometime early in 1973, and initially rather gently. Italy let its rate of monetary expansion accelerate in 1972 and made but a small reduction in 1973. If monetarist analysis is correct, if exchange rate flexibility is maintained, and if the policies described here are adhered to through 1974-1975, 1974 will prove to have seen the peak of Germany and Switzerland's inflation rates, while 1975 will see the peak for the others.

Now all this has implications for the behaviour of exchange rates. A view of money that stresses its information producing role (e.g., Brunner, Meltzer 1971) seems to imply that stable exchange rates are to be regarded as desirable and that debates about fixed vs flexible rates should be about which system would do most to promote exchange rate stability. The abandonment of fixed rates after 1971 led to a strong divergence in national inflation rates as divergent domestic policies were pursued. The consequence of this has been considerable movements in exchange rates and we should expect this to continue in the next year or so. But in this fact lies one of the most important policy implications of those aspects of the monetarist explanation of inflation tested in this paper. We have seen that, under fixed exchange rates, relatively small open economies can have only a marginal influence over their own inflation rates. It is also true that, if they take the option that exchange rate flexibility confers upon them of pursuing their own domestic goals and if their domestic policies diverge markedly, then exchange rate instability results. To achieve exchange rate stability therefore, whether it be under a scheme of formally fixed or formally flexible rates, requires that individual countries perhaps with the exception of the United States accept that they cannot have

any but marginal control over their own inflation rates.[38] Policies towards inflation must be co-ordinated across countries if exchange rate stability is to be achieved. It is the pursuit of stable exchange rates rather than the maintenance of institutionally fixed exchange rates that makes inflation an international monetary phenomenon and it follows that there is a vital political problem to be solved in terms of devising the institutional framework within which national policies can be so co-ordinated that inflation is tackled at the international level.

FOOTNOTES

[1]See for example papers by Brunner (1974), Brunner et al. (1973), Laidler (1972), (1973), Korteweg (1973), Spinelli (1974), Parkin, Sumner and Ward (1974), etc.

[2]In a paper (1974) which became available in England only after this one was well under way, Karl Brunner provides a similar but not identical taxonomy. He talks of Price Theoretic, Institutionalist and Eclectic approaches to the problem of inflation. His use of the term "institutionalist" corresponds quite closely to my use of 'sociological'. Within his price theoretic classification Brunner distinguishes between those economists who regard the first impulse to rising prices as coming from an exogenous increase in the quantity of money--monetarists--and those who, following the Keynes/Wicksell tradition, see the first impulse as coming from an autonomous increase real expenditure brought about by fiscal expansion or a rise in the Wicksellian natural rate of interest. The Wicksellian mechanism still needs an expanding money supply to support continuing inflation, and, if the increase in autonomous expenditure originates with the government, then monetary expansion may well be the way in which the government's budget constraint is met. Thus, I am content to class both groups under the 'monetarist' label. The differences between them do not seem to me to reflect any fundamental differences of opinion about the way in which the economic system works. As Brunner says, both explanations are well grounded in price theory, in sharp contrast to the institutionalist and certain eclectic explanations of inflation. The differences in emphasis between myself and Brunner implicit here in large measure reflect differences in emphasis in the debate about inflation as it appears in the United States and Britain. Those economists who in the United States class themselves as "Keynesians" base their analysis on orthodox price theory, whilst most British

"Keynesians", in denying any importance to the quantity of money, either as an active cause of inflation or as an important permissive factor in the process, put themselves firmly among adherents of a sociological view of inflation. In the context of the British debate about inflation, price theoretic explanations of inflation are usually classed as monetarist.

[3]I base this account of the sociological view of inflation on a number of sources. The clearest account of the view that the behaviour of wages as a sociological matter having nothing to do with market forces but a great deal to do with the working out of competing views about the fairness of the wage structure is to be found in Hicks (1974) Ch. 3, who here harks back to ideas first propounded in the Theory of Wages. A leading proponent of the view that the strike weapon has become increasingly more powerful is Phelps-Brown, cf. for example (1971). Neither Hicks nor Phelps-Brown pay much attention to international aspects of inflation, but several contributors, for example Marris, to the 1971 Dauphine conference (cf. Claassen and Salin 1973) stress this matter, and advance the demonstration effect hypothesis to explain the international transmission of inflation. Note also that certain commentators, notably Harrod (1972) and Wiles (1973) view inflation as but one of several symptoms of social breakdown that are appearing on a world wide scale.

[4]The need to develop a monetary explanation of inflation in terms of a general as opposed to partial equilibrium or disequilibrium model is a matter discussed at length in Laidler and Parkin (1975).

[5]Whether monetary expansion increases in the nominal value of aggregate demand or is merely necessary for increases coming from other sources to have persistent effects thereon is the point at issue between the viewpoints

that Brunner calls monetarist and Keynes-Wicksellian. Since Brunner wrote, the centre of the debate about money and inflation seems to have shifted to questions about the aggregate demand-inflation rate linkage. Hicks, for example, would appear to agree that exogenous monetary contraction would contract the money value of aggregate demand. However, unlike the monetarists he would expect the contraction to fall heavily upon income and employment and have little effect upon the inflation rate. Monetarists, of course, would expect unemployment increases to lead to a slowdown in the inflation rate.

[6]Thus an essential ingredient to the monetarist's explanation of inflation in the international economy is the so-called monetary theory of the balance of payments. The most accessible account of the application of this body of doctrine to the problem of inflation is to be found in Harry Johnson's 1971 De Vries lectures (1972).

[7]Jones (1972) book The New Inflation is a good example of that body of literature devoted to demonstrating the uniqueness of recent experience. However, Hicks (1974)(1975) also seems to be a proponent of this view.

[8]Once again, the 1971 Dauphine conference provides a useful source of opinion. Assar Lindbeck's contribution to that conference seems to me to place him in the category of what we might term a 'scientific eclectic'.

[9]The question of the usefulness of strike activity as a measure of trade union 'militancy' is discussed at considerable length by Purdy and Zis (1974). They conclude that, until a properly articulated theory of the behaviour of trade unions in which it is made clear what it is those organizations are attempting to maximize, and subject to what constraints, it will be impossible to say anything definite about the significance of strike activity for the wage bargaining process. Nevertheless, both Taylor (forthcoming) and

Godfrey (1971) have used strike activity as an index of union militancy, taking it for granted that an increase in militancy is associated with an increase in strike activity.

[10]I am indebted to George Zis for drawing my attention to this alternative interpretation of the significance of strike activity within the sociological approach to the explanation of inflation.

[11]I advance the above hypotheses somewhat tentatively. I am open to the criticism that, as a monetarist, I am likely to propose particularly difficult and perhaps unfair tests of an opposing point of view. The only defence against such criticism can be to say that, if proponents of the sociological view of inflation would state their own views on what evidence might falsify their theories, it would not be necessary for those who disagree with them to carry out that task on their behalf.

[12]See Gray et al. 1975.

[13]Here there is a potential overlap between monetarist and eclectic theories. Thus an economist seeking to explain the behaviour of the inflation rate in one particular economy might well take the inflation rate of the world economy as a given and try to explain with a variety of special domestic factors the behaviour of domestic prices relative to a trend given from the outside. The so-called Nordic model of inflation does just this, and, as Brunner (1974) notes is not a theory of the behaviour of the general price level at all, but rather a theory of the behaviour of relative prices. Brunner puts this approach to inflation theory in the eclectic camp but I prefer to regard it as being potentially one component of a monetarist theory of inflation having to do with the transmission of inflation to one part of the world economy, rather than being concerned with its generation.

[14]Work currently being carried out by my colleagues at Manchester Malcolm Gray and Michael Parkin is attempting to combine a world aggregate demand for money function, a world aggregate supply of money function, and world aggregate price and wage equations, into a macro model of the world economy which will be a somewhat more elaborate version of the framework which I have constructed and used in analysing the United States economy (cf. Laidler 1973, 1974). The 'world' in question consists of ten countries.

[15]The two transmission mechanisms in question are discussed in more detail than is possible here in Laidler and Nobay (1974).

[16]Note that the expected inflation rate I am here discussing is conceptually different from the expected inflation rate that figures prominently as an argument in the aggregate demand for money function in inflationary situations. The latter is, in principle, an average of the expectations formed by <u>individual</u> agents about the behaviour of the general price level. The expected inflation rate that is relevant for wage and price setting is, according to the arguments being advanced here, an average of <u>individual</u> agents' expectations about the behaviour of the <u>individual</u> money prices of particular goods and services. Note also that I am here referring to domestic excess demand as a determinant of domestic inflation. As Pieter Korteweg points out in his discussion of this paper, there is no logical reason why world-wide excess demand cannot play a role here as well.

[17]In a small open fixed exchange rate economy, a permissive role for the money supply is potentially an integral part of monetarist analysis. Thus the distinction between the monetarist and the Keynes-Wicksell approach disappears. There is, however, still room to draw a distinction between the two approaches at the level of the world economy.

[18]See Cross and Laidler (1975).

[19]See Dicks-Mireau (1961) for an example of an empirical study laying stress on the importance of import prices in generating 'cost-push' inflation in Britain. Note that Brunner (1974) treats import prices, along with the level of world trade, as one of the principal routes whereby inflation is transmitted between economies. It is interesting that he concludes that import price rises do not seem to be able to account for a large amount of domestic price level rises and suggests that one would have to look to the role of expectations if one wished to sustain the view that the behaviour of world prices dominates the behaviour of domestic prices.

[20]This consideration suggested that France ought also to be analysed. However, the absence of strike activity data for 1968, the very year in which 'militancy' was at its peak in France precluded its inclusion.

[21]Of course quarterly data are also available for the series used here. However, in this paper we are ultimately concerned to compare hypotheses, and the type of data used overall must be governed by what we may term the "least available" series. The world inflation rate variable used below is only readily available on an annual basis and that is the overriding reason for using annual data in this study.

[22]There is of course an element of data mining here but perhaps the reader will agree that the practice is less reprehensible when its purpose is to improve the performance of a model in which one has little faith so as to be as fair to one's opponents as possible than it is when it is used to bolster up one's own hypothesis in order to be unfair to opponents.

[23]Note that Ward and Zis (1974) found that unemployment entered linearly tended to be a poor proxy for excess demand. They replaced it with the inverse of the unemployment rate in their study and considerably improved their results. However, they found less role for strike activity to play than I report here and it would be worth some further work to find out why this is the case.

[24]This result echoes one of the principal conclusions reached by Brunner et al. (1973).

[25]The main difference lies in the computation of y. In the earlier study this was measured as a deviation of national income from a trend measured over the slightly longer period 1952-1973. Note that for the U.K. the observation on $\Delta\Pi$ for 1968 is dominated by the effects of the devaluation in 1967, and that the 1962 observation for Germany is similarly dominated by the small revaluation of the Mark. Since one would not expect jumps in the values of fixed exchange rate currencies to have an effect on expectations that is captured by a simple error learning mechanism, the observations in question are deleted from the equations estimated here. Cross and Laidler (1975) have discussed this issue more fully.

[26]It is particularly noteworthy that it is the large United States economy that one would normally regard as being 'closed' that produces the heaviest weight on domestic inflation as a source of expectations about inflation. However, the results repeated here show U.S. inflation expectations responding much more rapidly to experience than those reported by Cross and Laidler.

[27]These results present a striking confirmation of Brunner's conjecture that, if world-wide influences were to be accorded a significant effect on domestic inflation rates, this effect would be found to be working through expectations rather than through import prices.

[28]This matter is more fully discussed in Cross and Laidler (1975). Also, cf. footnote 25 above.

[29]Note, however, that for Japan the two equations perform equally badly. The monetarist equation's superiority here is only marginal.

[30]The temporary overprediction for 1972 for the United States probably reflects the short term effects of the Nixon administration's price control legislation during 1971-1972. I have discussed this matter in some detail in Laidler (1974) where, however, only domestic inflation was allowed to influence U.S. inflationary expectations.

[31]Unless, of course, it is regarded as an 'eclectic' characteristic to lay strong emphasis on the world inflation rate when discussing domestic inflation.

[32]This, of course, is not to say that other countries did not have policies towards the behaviour of prices and wages. We are concerned here with the statutory control of these variables. Note that, just as the United States had 'wage price guidelines' in the earlier 1960's so Britain also had a series of so-called 'voluntary incomes policies' during earlier periods. A survey of the literature on the effectiveness of British policies is to be found in Parkin, Sumner and Jones (1972), where it is also pointed out that Cripps voluntary wage freeze of 1948-1949, which did have trade union co-operation worked for a short time but was followed by a 'wage explosion' in 1950. This was the only period in which such policies could be discerned to have had any effects. Note that, in 1973, Switzerland set up an official body for the surveillance of wages, prices and profits, thus, implementing what amounts to a voluntary wage-price control policy. Its effectiveness must remain to be seen, but the precedents are hardly encouraging.

[33]For a more detailed account of this short-lived success, see Laidler (1974) where a somewhat different model, which explicitly incorporates the effects of monetary expansion rates, but ignores overseas influences also fails to predict the fall in the inflation rate between 1971 and 1972. Thus the conclusion offered here about a short term success for this particular policy is rather robust. Note also that both Parkin (1973) and Laidler (1974) point to a sharp but short-lived fall in the level of short term nominal interest rates immediately after August 1974. This is entirely consistent with wage price controls having an effect on inflationary expectations.

[34]There is an awkward problem of timing here. Policies that influence aggregate demand, and particularly monetary policies operate with a long lag; and one that is widely regarded as variable. Thus there are grave practical difficulties in implementing a co-ordinated policy of demand management and wage price controls in such a way that each policy tool has its effects at a time appropriate for the success of the overall package. I have also discussed this question in Laidler (1974).

[35]Both Switzerland and Germany operated some restrictions on capital inflows throughout the 1960's. These involved limits--or prohibitions-- on interest payments on overseas holdings of deposits, special reserve requirements against non-resident owned deposits and, in the case of Switzerland, limits on non-resident ownership of securities and real estate. Ironically the end of the 1960's saw a considerable relaxation of the controls by both countries, but they were rapidly re-imposed beginning in mid-1970 in Germany and towards the end of 1971 in Switzerland.

[36]This conclusion also gets strong support from the evidence presented in Cross and Laidler (1975).

[37]The influence of United States policy on the 'world' money supply is analysed by Parkin et al. (1975) while the stability of a 'world' demand for money function is demonstrated by Gray et al. (1975). Thus it makes considerable sense to think of United States monetary policy having a dominant role to play in the behaviour of prices on a world-wide basis.

[38]This argument is of course a powerful part of the case for a monetary union among Common Market countries. Though any one acting alone can have little control over its own price level in a stable exchange rate world, acting collectively, they could have considerable influence.

Table 1*

Regression of ΔP on y_{-1} and $S3_{-1}$ 1954-1970

	Intercept	y_{-1}	S_{-1}	R^2	RSS	D.W
U.S.A.	.008 (.007)	.3808 (.1006)	4.071 (2.270)	.559	.00215	1.14
Italy	.021 (.003)	.7500 (.1270)	.0068 (.003)	.827	.00092	2.50
Japan	.048 (.017)	.4571 (.1592)	-.012 (.038)	.376	.00626	1.27
U.K.	.020 (.007)	.9884 (.2442)	.030 (.016)	.539	.00173	1.35
Germany	.023 (.003)	.07923 (.03566)	-.034 (.031)	.398	.00081	1.10
Switzerland	.026 (.003)	.369 (.081)	-2.554 (1.112)	.613	.00124	1.11

*Note: S is measured in Unity of 10,000 man days lost in strikes per annum in this and the next three tables.

Table 2

Regression of ΔW on u and S 1954-1970

	Intercept	u	S	R^2	RSS	D.W.
U.S.A.	.074 (.009)	-.009 (.002)	2.479 (1.039)	.711	.00064	1.16
Italy	.035 (.024)	-.002 (.003)	.036 (.009)	.671	.00875	1.59
Japan	.210 (.034)	-.064 (.024)	.124 (.048)	.518	.00967	0.95
U.K.	.064 (.017)	-.013 (.009)	.046 (.017)	.252	.00363	2.08
Germany	.091 (.0010)	-.009 (.004)	.084 (.132)	.276	.00946	1.12
Switzerland	Not available: no consistent series for u.					

Table 3

Regression of ΔW on y and S 1954-1970

	Intercept	y	S	R^2	RSS	D.W.
U.S.A.	.029 (.005)	.248 (.067	2.943 (1.289)	.557	.00097	1.12
Italy	.026 (.007)	1.150 (.254)	.029 (.005)	.861	.00368	2.15
Japan	.137 (.022)	.473 (.199)	-.129 (.049	.490	.01020	.98
U.K.	.034 (.008)	.691 (.326)	.041 (.016)	.350	.00315	2.17
Germany	.070 (.009)	.325 (.117)	-.020 (.098)	.383	.00806	.84
Switzerland	.040 (.004)	.235 (.141)	-.478 (2.446)	.170	.00374	.49

Table 4

Correlations between countries 1954-1970

of

A. Price Inflation

	U.S.	Italy	Japan	U.K.	Germany	Switzerland
U.S.	1	-.06	+.36	+.50	+.40	+.38
Italy		1	+.51	+.20	+.52	+.63
Japan			.1	+.18	+.41	+.61
U.K.				1	+.63	+.42
Germany					.	+.75
Switzerland						1

B. Wage Inflation

	U.S.	Italy	Japan	U.K.	Germany	Switzerland
U.S.	1	-.03	.33	.52	.09	.05
Italy		1	.61	.41	.61	.63
Japan			1	.44	.28	.71
U.K.				1	.55	.31
Germany					1	.53
Switzerland						1

C. Strike Activity

	U.S.	Italy	Japan	U.K.	Germany	Switzerland
U.S.	1	.26	-.04	.44	-.40	-.31
Italy		1	-.19	.46	-.32	-.07
Japan			1	.20	-.09	-.31
U.K.				1	-.24	-.30
Germany					1	.65
Switzerland						1

Table 5

$$\Delta^2 P = gy_{-1} - (1-d)gy_{-2} + d(1-v)(\Delta\Pi_{-1} - \Delta P_{-1}) \quad 1954\text{-}1970$$

	g	d	v	RSS
U.S.A.	.270 (.092)	.832 (.336)	.670 (.159)	.00112
Italy	.940 (.242)	.436 (.218)	0* (0)	.00262
Japan	.335 (.165)	.353 (.525)	.257 (1.027)	.00621
U.K.+	.894 (.272)	.470 (.270)	.575 (.391)	.00192
Germany+	.147 (.070)	.206 (.262)	0* (0)	.00109
Switzerland	.432 (.101)	.368 (.203)	0* 0	.00099

*Parameter estimate hit constraint

+Note that the observations for 1969 for Britain and 1962 for Germany were deleted from the sample before these estimates were obtained. The same is true of Tables 6-13.

	Regression of $\Delta^2 P$ on y_{-1}, y_{-2}, and $(\Delta\Pi_{-1} - \Delta P_{-1})$ 1954-1970				Reduced from paramete Π implicit in Table 5		
	y_{-1}	y_{-2}	$(\Delta\Pi_{-1} - \Delta P_{-1})$	RSS	y_{-1}	y_{-2}	$(\Delta\Pi_{-1} - \Delta P_{-1})$
U.S.A.	.270 (.092)	-.045 (.100)	.274 (.126)	.00112	.270	-.045	.274
Italy	.946 (.242)	-.575 (.260)	.455 (.226)	.00260	.940	-.530	.436
Japan	.335 (.164)	-.217 (.172)	.262 (.170)	.00621	.335	-.217	.262
U.K.	.894 (.272)	-.473 (.268)	.200 (.169)	.00192	.894	-.473	.200
Germany	.138 (.061)	-.160 (.053)	.351 (.241)	.00084	.147	-.117	.206
Switzerland	.461 (.093)	-.328 (.615)	.615 (.233)	.00082	.432	-.273	.368

Table 7

Regression of ΔP on y_{-1}, y_{-2}, ΔP_{-1}, $\Delta \Pi_{-1}$ 1954-1970

	y_{-1}	y_{-2}	ΔP_{-1}	$\Delta \Pi_{-1}$	RSS
U.S.A.	.270 (.096)	.044 (.112)	.723 (.170)	.274 (.131)	.00112
Italy	.938 (.252)	-.578 (.269)	.540 (.234)	.502 (.285)	.00259
Japan	.320 (.161)	-.163 (.172)	.608 (.193)	.727 (.389)	.00548
U.K.	.872 (.278)	-.552 (.294)	.766 (.178)	.344 (.262)	.00184
Germany	.132 (.064)	-.166 (.056)	.704 (.282)	.342 (.250)	.00083
Switzerland	.472 (.094)	-.357 (.108)	.416 (.236)	.661 (.239)	.00076

Table 8

Regression of ΔP on y_{-1}, y_{-2}, ΔP_{-1}, $\Delta \Pi_{-1}$ 1954-1970

	Intercept	y_{-1}	y_{-2}	ΔP_{-1}	$\Delta \Pi_{-1}$	R^2	RSS	D.W.
U.S.A.	.004 (.005)	.267 (.097)	-.007 (.124)	.630 (.212)	.203 (.164)	.780	.00107	2.13
Italy	.034 (.009)	.963 (.175)	.200 (.274)	-.354 (.282)	.191 (.213)	.785	.00114	1.86
Japan	.018 (.014)	.368 (.160)	-.055 (.186)	.369 (.259)	.410 (.446)	.524	.00477	2.15
U.K.	.017 (.014)	.710 (.306)	-.054 (.509)	.362 (.382)	.149 (.305)	.524	.00163	1.46
Germany	.010 (.005)	.110 (.057)	-.095 (.058)	.443 (.270)	.124 (.237)	.562	.00057	1.83
Switzerland	.007 (.004)	.445 (.086)	-.284 (.104)	.320 (.219)	.467 (.238)	.820	.00058	2.12

Table 9

Regression of ΔP on y_{-1}, y_{-2}, ΔQ_{-1}, ΔP_{-1} 1954-1970

	Intercept	y_{-1}	y_{-2}	ΔQ_{-1}	ΔP_{-1}	R^2	RSS	D.W.
U.S.A.	.008 (.005)	.265 (.106)	-.018 (.130)	.062 (.119)	.660 (.221)	.758	.00118	2.25
Italy	.038 (.008)	.924 (.168)	.160 (.266)	.072 (.054	-.334 (.268)	.801	.00106	1.78
Japan	.023 (.012)	.450 (.175)	-.127 (.205)	-.071 (.096)	.437 (.264)	.513	.00488	1.89
U.K.	.024 (.011)	.498 (.278)	.071 (.377)	.245 (.331)	.156 (.079)	.642	.00123	1.42
Germany	.018 (.006)	.065 (.053)	-.044 (.061)	.247 (.268)	.094 (.060)	.633	.00047	1.50
Switzerland	.012 (.004)	.375 (.106)	-.281 (.123)	.092 (.114)	.549 (.200)	.774	.000725	1.80

Table 10

$$\Delta^2 P = gy_{-1} - (1-d)gy_{-2} + bS_{-1} - (1-d)bS_{-2} + d(1-v)(\Delta\Pi_{-1} - \Delta P_{-1}) \qquad 1954\text{-}1970$$

	g	d	b	v	RSS
U.S.A.	.277 (.096)	.755 (.349)	.572 (.974)	.665 (.178)	.00109
Italy	.741 (.253)	.235 (.281)	.007 (.004)	0* (0)	.00217
Japan	.342 (.152)	.945 (.396)	.030 (.016)	.387 (.208)	.00504
U.K.	.942 (.266)	.480 (.244)	.016 (.012)	.319 (.467)	.00168
Germany	.149 (.072)	.210 (.277)	.007 (.030)	0* (0)	.00109
Switzerland	.433 (.105)	.366 (.212)	.080 (.893)	0* (0)	.00993

*Coefficient hit constraint

Table 11

Annual Percentage Rates of Change of
"Narrow Money" from preceding year

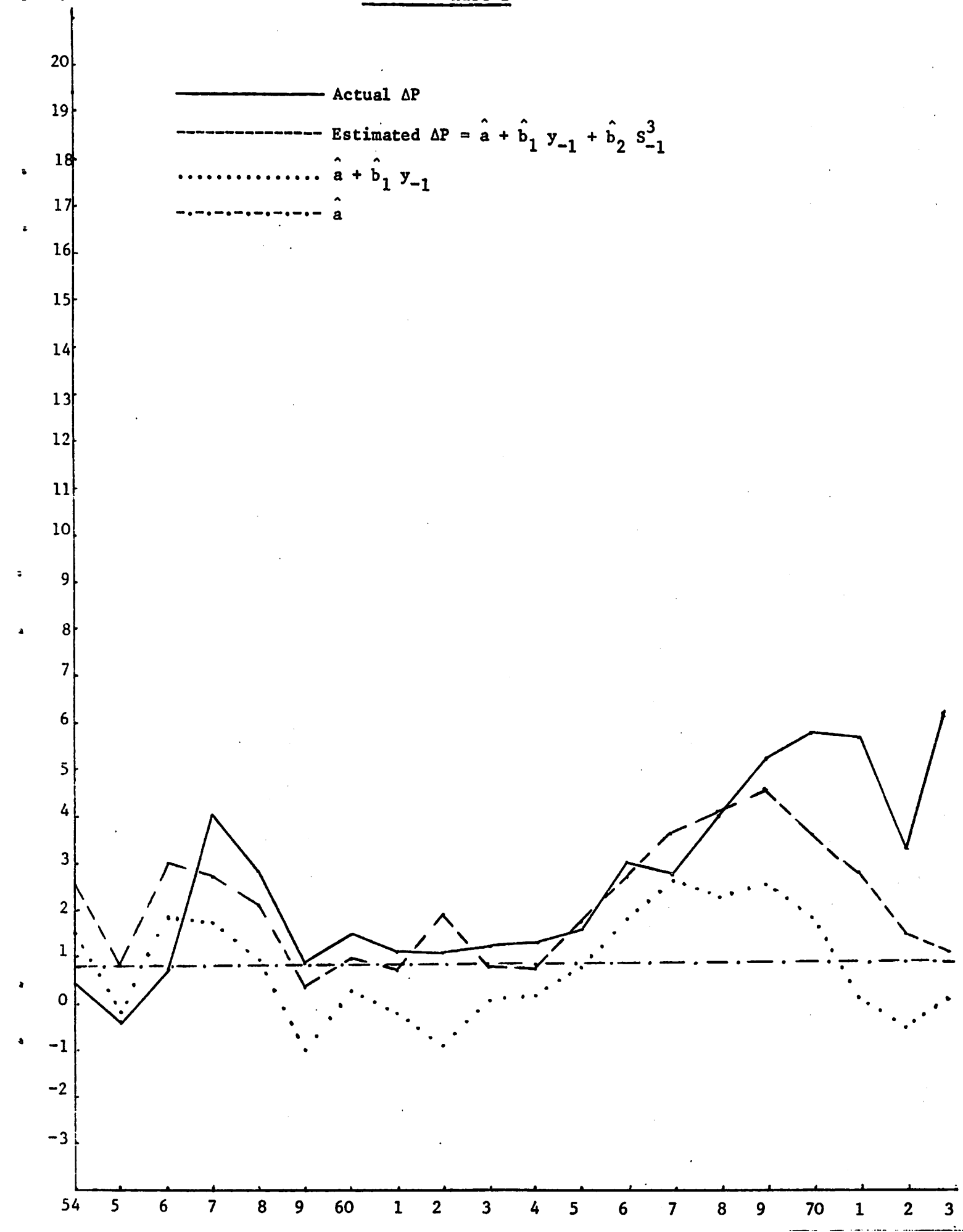
Year		U.S.	Italy	Japan	U.K.	Germany	Switzerland
1954		1.6	9.3	NA	3.8	9.6	3.9
1955		3.1	10.1	NA	-1.1	11.2	2.3
1956		1.2	9.2	14.1	0.5	9.0	5.1
1957		0.6	6.5	12.8	-1.6	10.3	4.7
1958		1.2	8.6	5.5	2.5	12.8	6.2
1959		3.8	13.4	16.4	8.3	13.8	9.1
1960		-0.1	13.0	19.9	0.4	8.3	6.4
1961		2.1	14.1	25.1	2.0	9.6	13.4
1962		2.2	17.8	15.9	4.8	10.6	12.1
1963		2.9	16.9	26.4	3.4	7.0	8.9
1964		4.0	6.2	16.8	3.2	8.5	7.6
1965		4.2	13.4	16.8	3.9	9.6	5.1
1966		4.5	15.8	16.3	-0.1	4.5	3.2
1967		3.9	12.9	13.4	7.6	3.3	6.0
1968		7.0	13.1	14.6	4.1	7.7	10.8
1969		6.3	13.2	18.4	0.3	10.1	9.7
1970		4.5	22.4	18.3	9.3	6.1	10.0
1971		7.1	21.0	25.5	15.3	12.1	18.5
1972*	1	6.3	15.9	26.3	15.1	13.5	20.3
	2	5.6	18.6	22.4	18.6	12.6	15.7
	3	6.1	19.6	17.0	16.5	13.8	12.4
	4	7.7	22.5	23.0	14.4	14.4	6.0
1973*	1	8.2	21.6	26.1	9.8	12.7	0.01
	2	8.0	23.9	30.4	12.3	8.6	0.0
	3	7.3	24.8	29.2	7.8	1.6	-2.0
	4	6.1	23.0	19.8	5.8	0.9	0.5
1974	1	6.0	19.6	16.5	3.3	0.8	-1.4
	2	6.0	19.9	13.6	0.0	3.5	-0.9
	3	5.5	18.1	12.5	-	8.9	-1.7

*Annual Rates of change over the preceding year

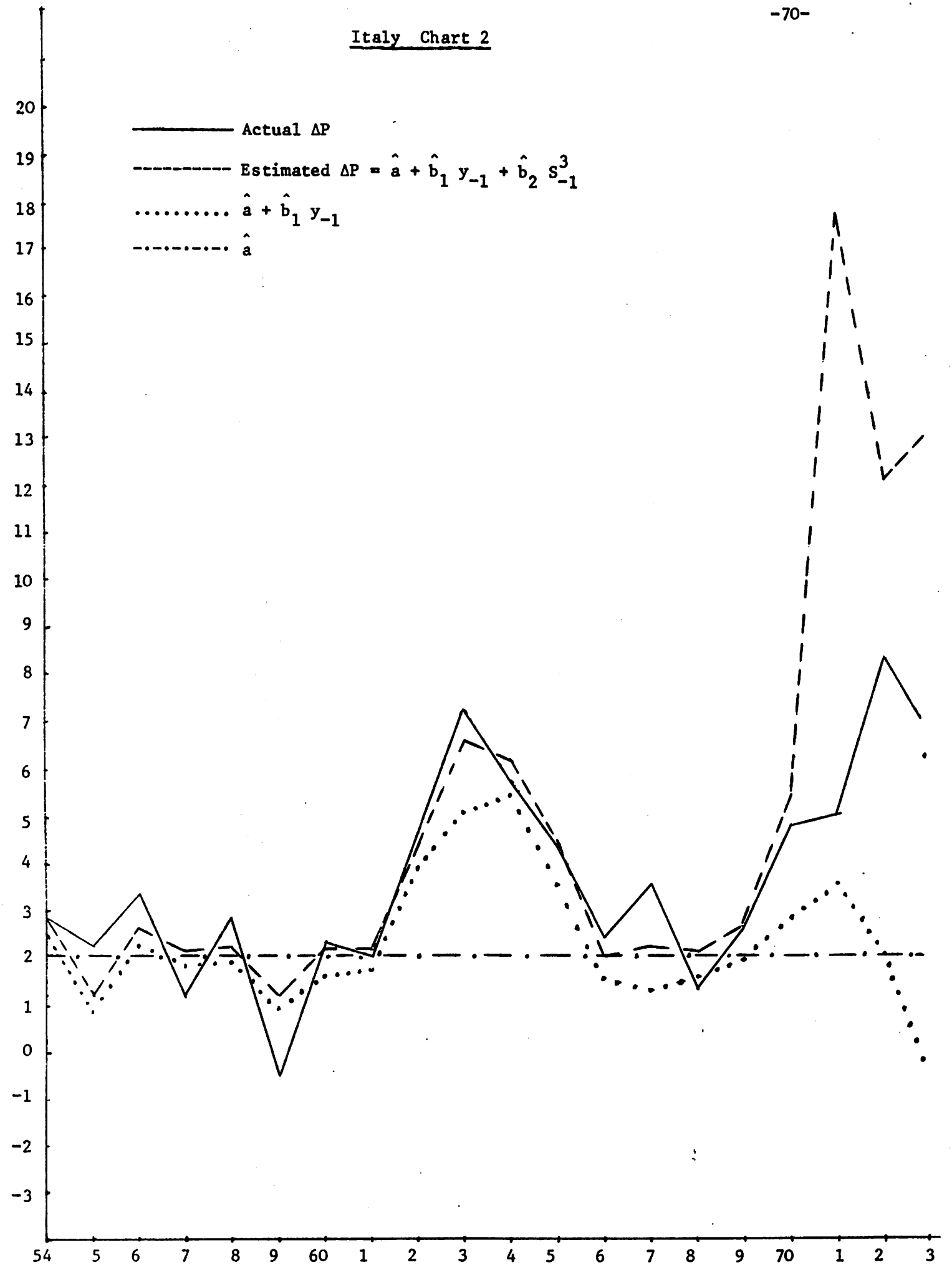
Source: Federal Reserve Bank of St. Louis

per cent
per year

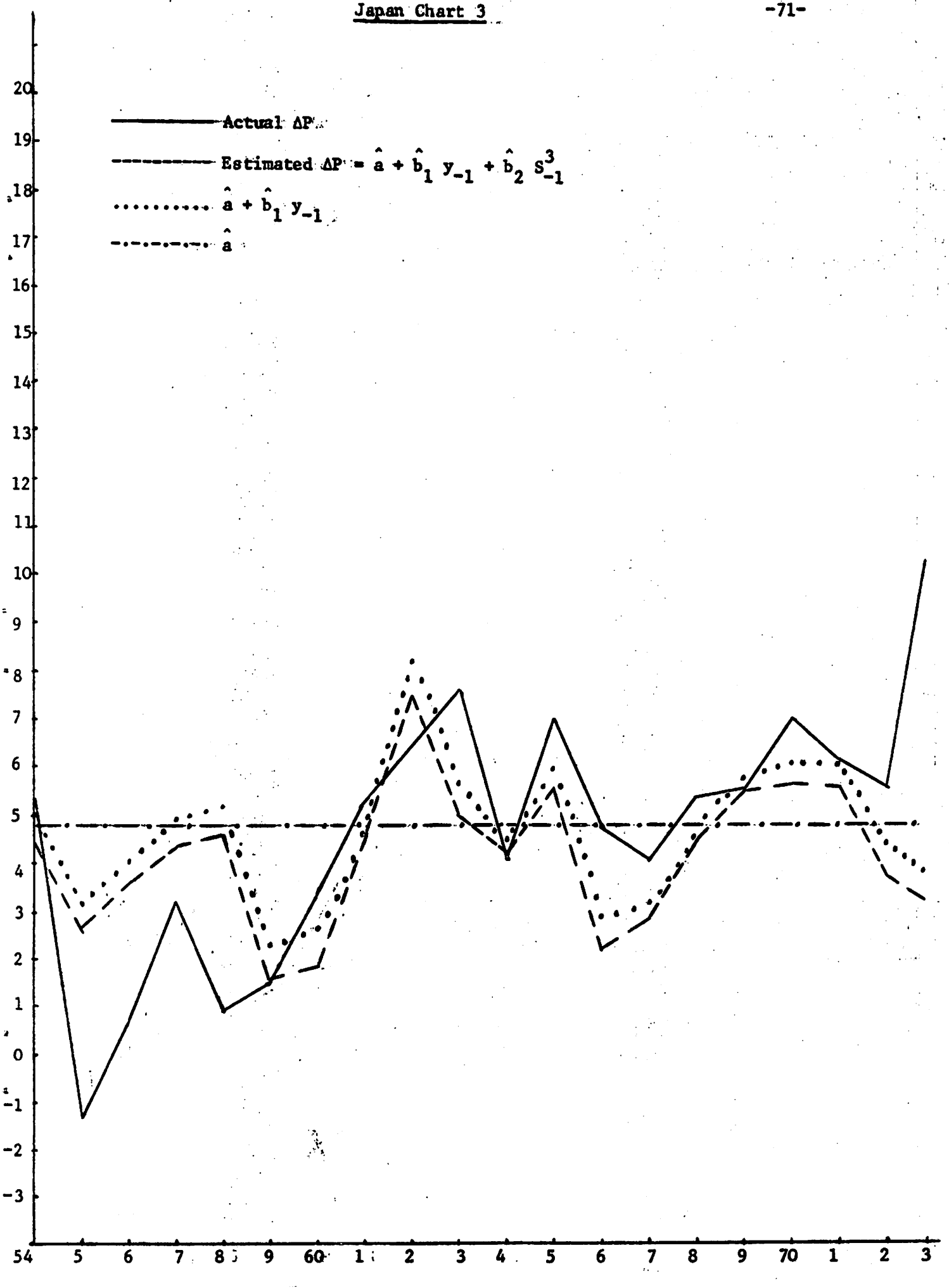
U.S.A. Chart 1

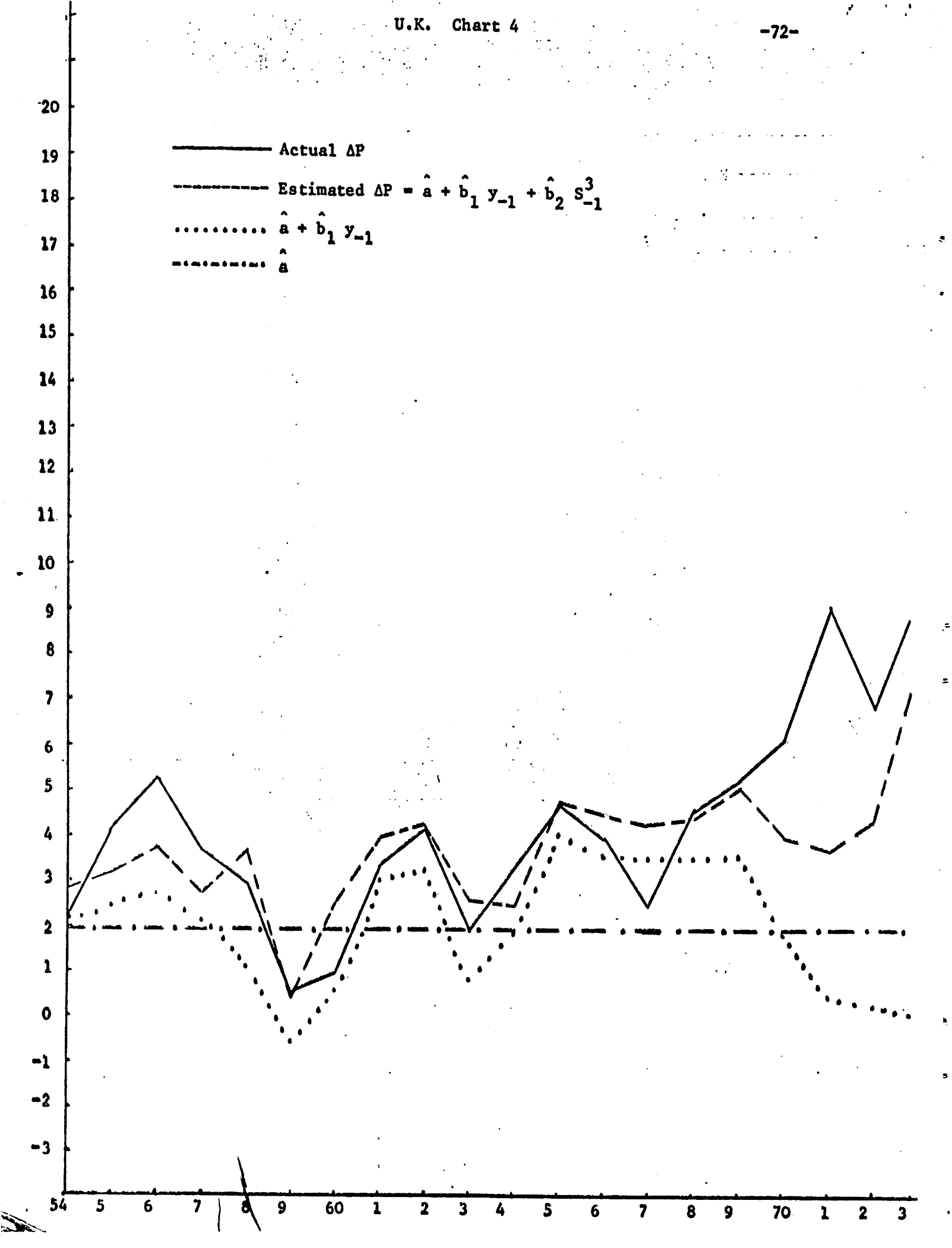


Italy Chart 2



Japan Chart 3




Actual ΔP
Estimated ΔP = $\hat{a} + \hat{b}_1 y_{-1} + \hat{b}_2 S^3_{-1}$
$\hat{a} + \hat{b}_1 y_{-1}$
$\hat{a}$
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19
18
17
16
15
14
13
12
11
10
9
8
7
6
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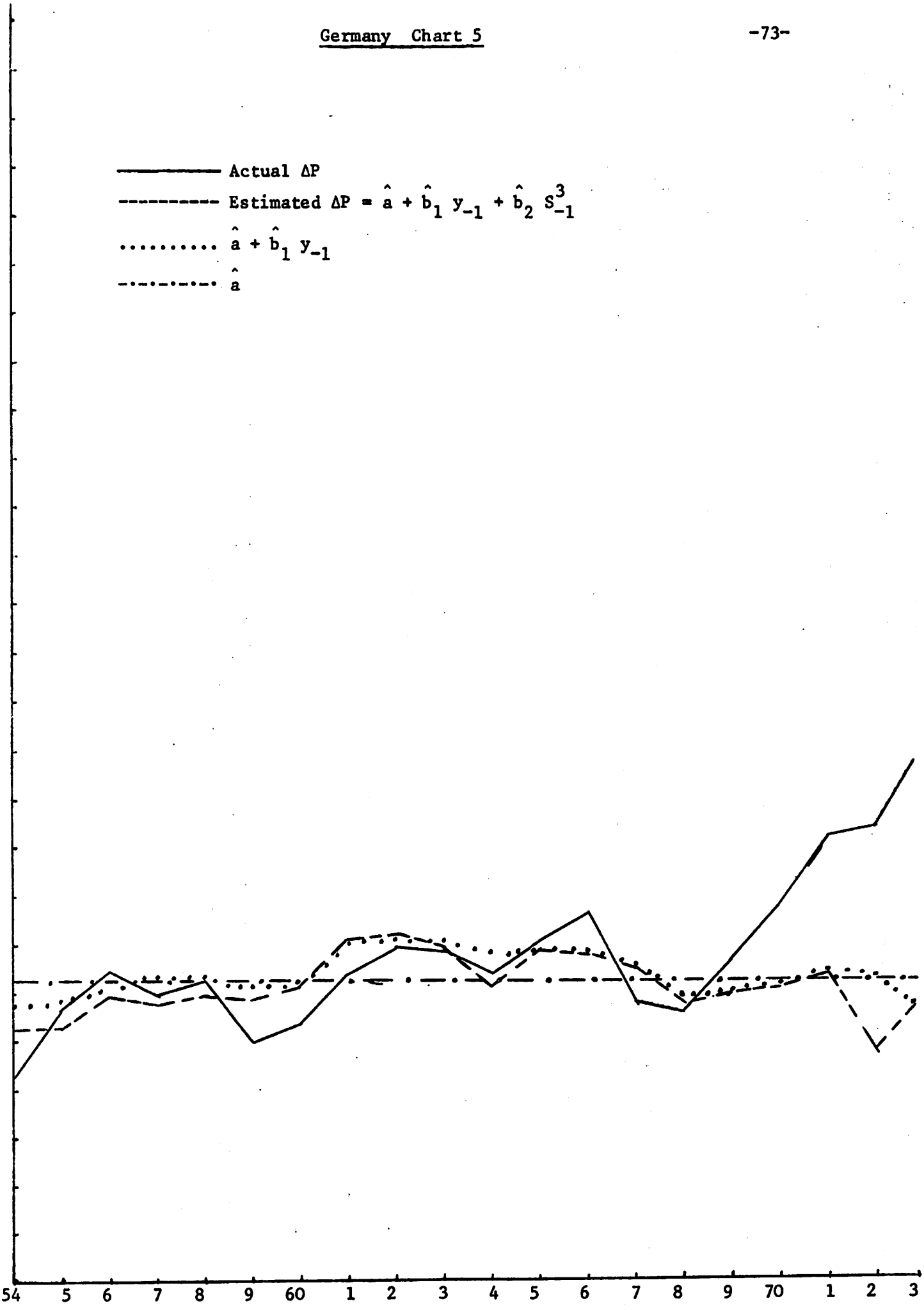
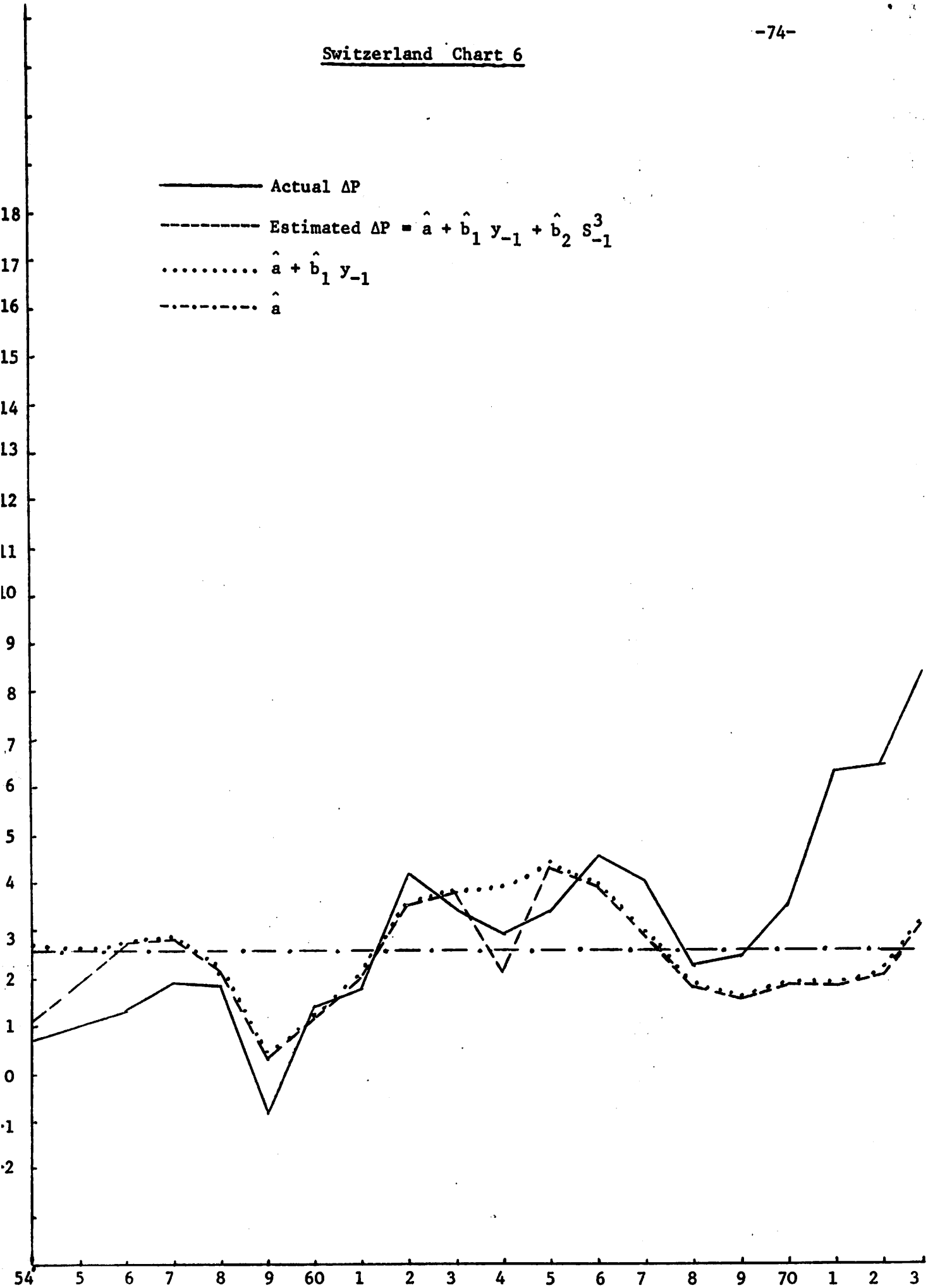
4
3
2
1
0
-1
-2
-3
54 5 6 7 8 9 60 1 2 3 4 5 6 7 8 9 70 1 2 3

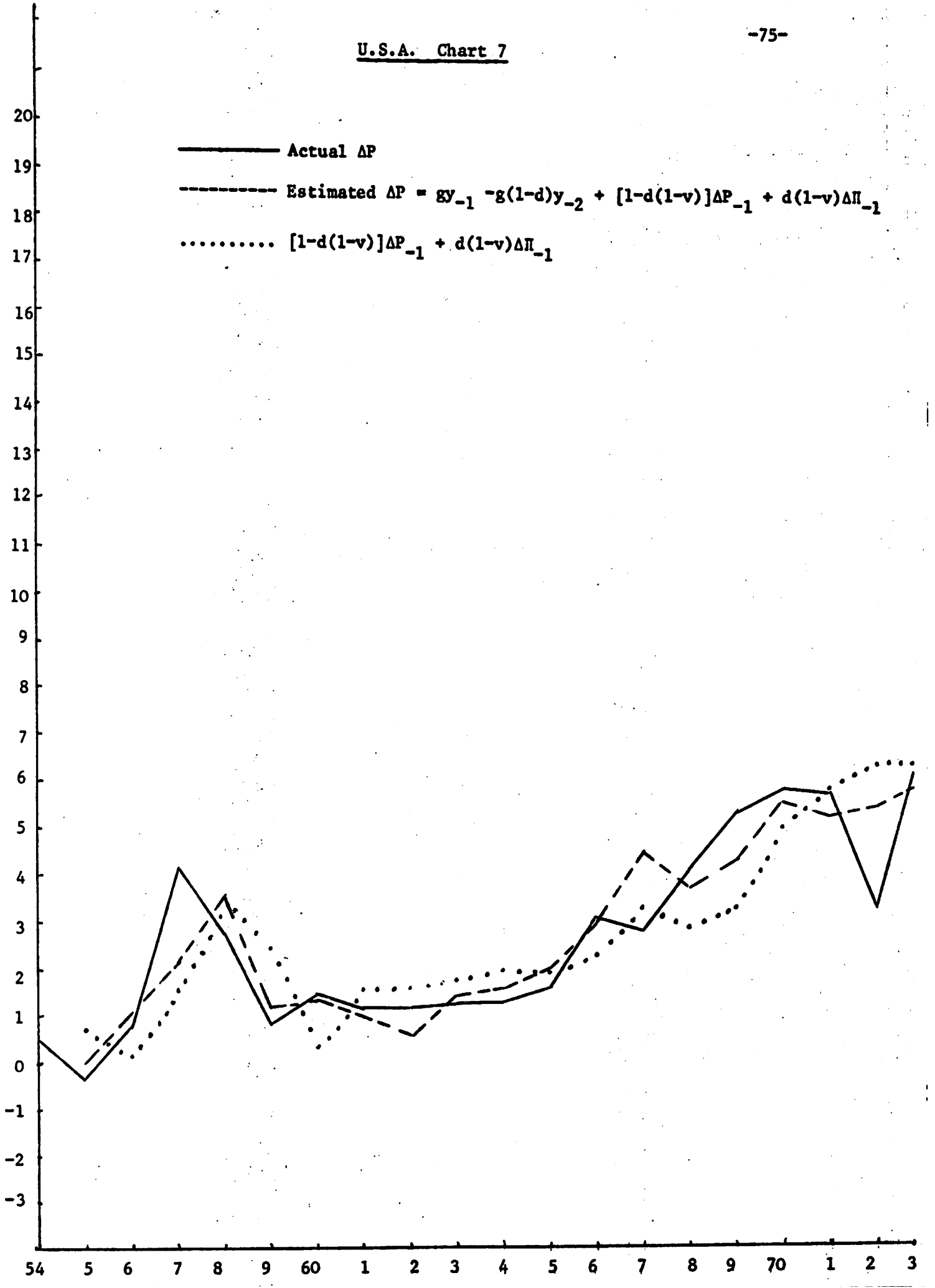
Germany Chart 5



Switzerland Chart 6



U.S.A. Chart 7


Actual ΔP
Estimated ΔP = gy_-1 -g(1-d)y_-2 + [1-d(1-v)]ΔP_-1 + d(1-v)ΔΠ_-1
[1-d(1-v)]ΔP_-1 + d(1-v)ΔΠ_-1
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-2
-3
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4
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70
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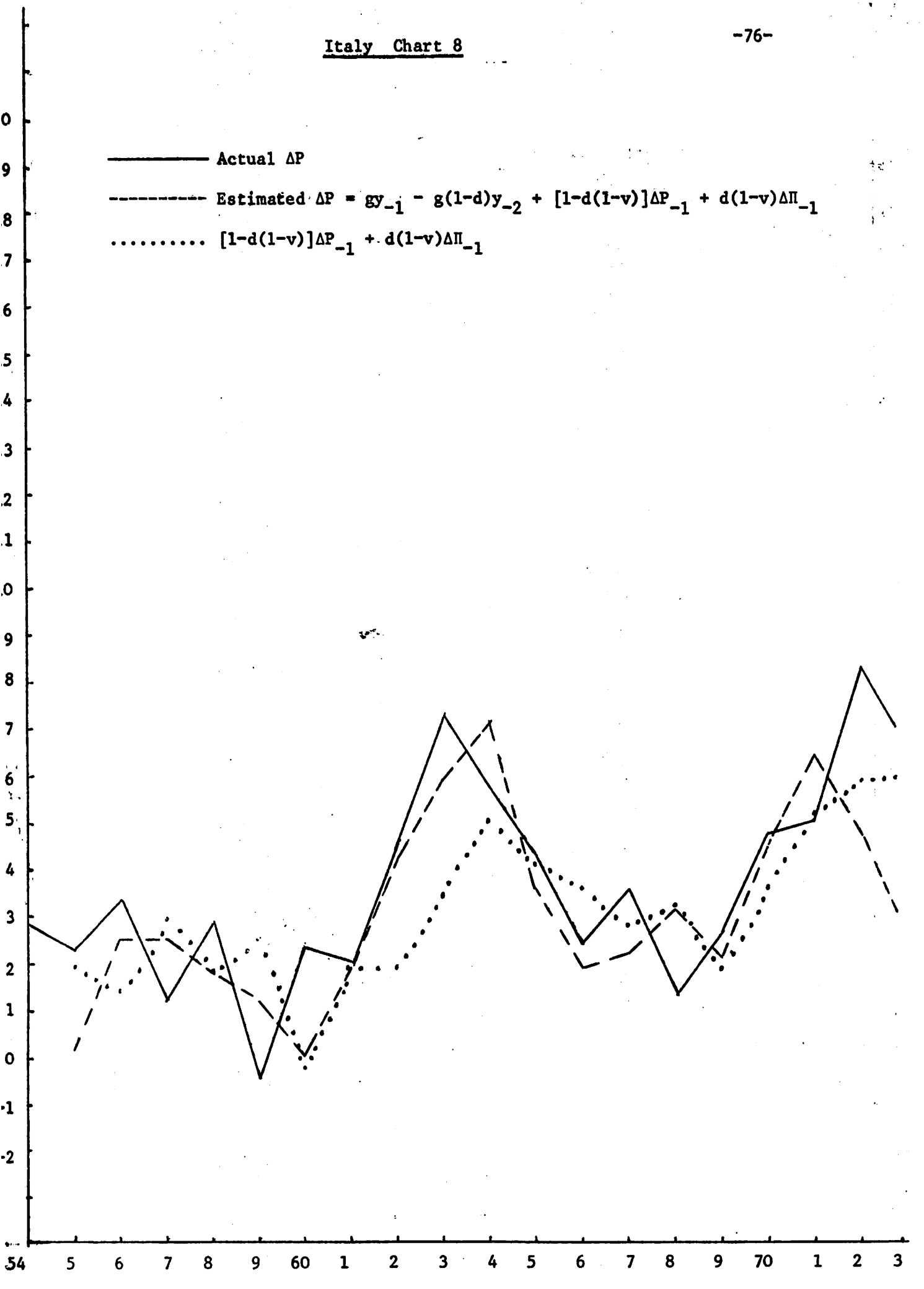
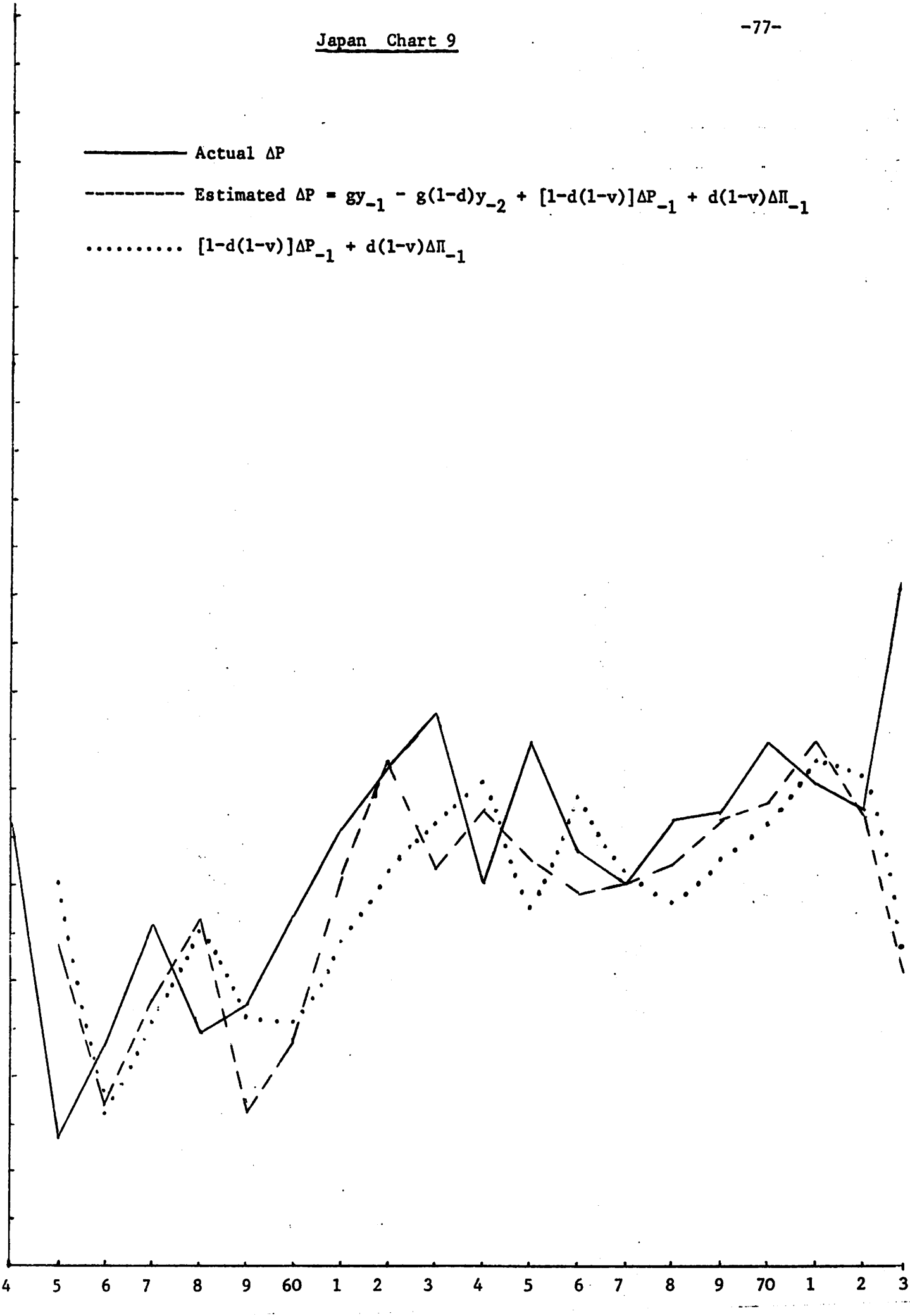
2
3

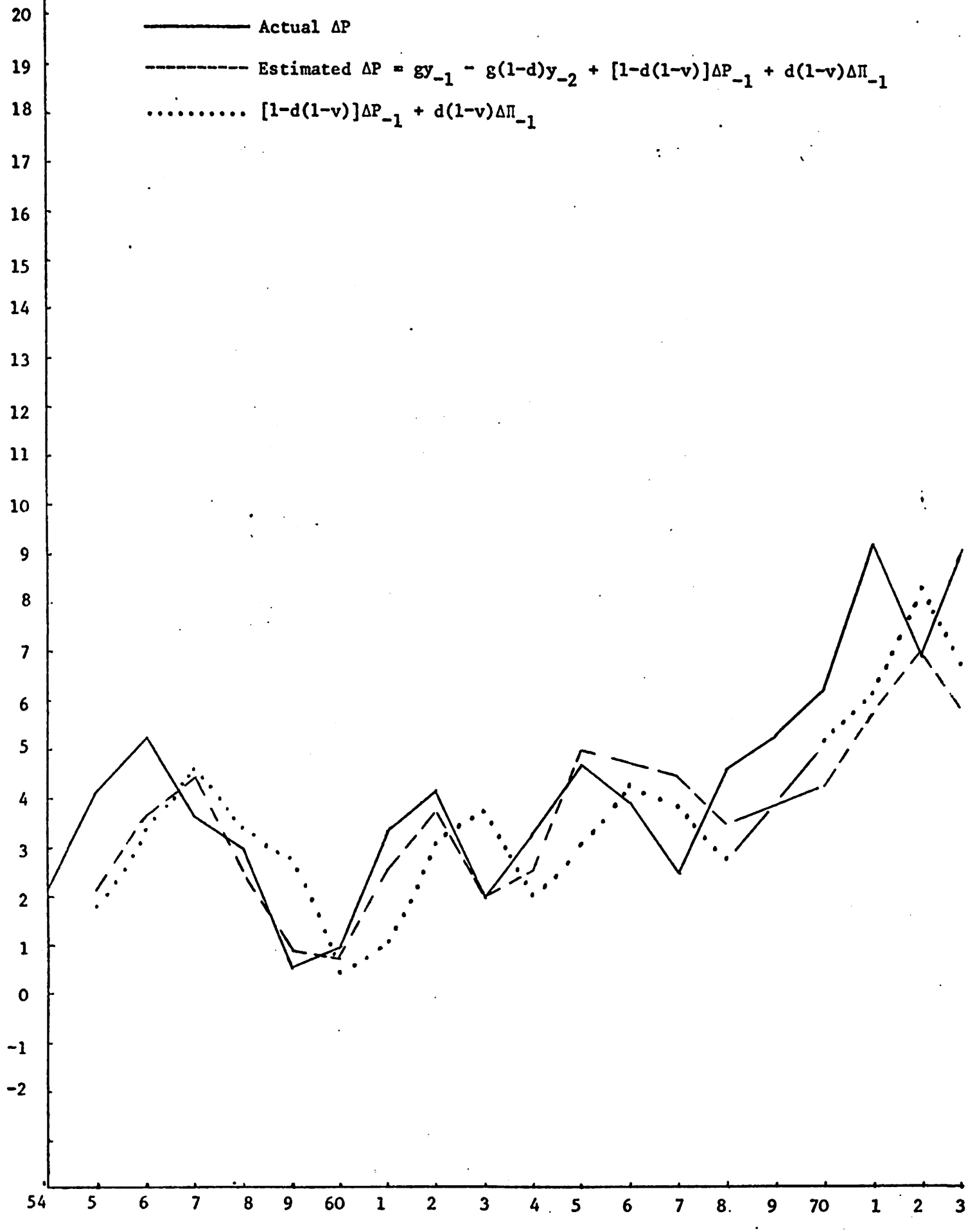
Italy Chart 8



Japan Chart 9



U.K. Chart 10


Actual ΔP
Estimated ΔP = $gy_{-1} - g(1-d)y_{-2} + [1-d(1-v)]\Delta P_{-1} + d(1-v)\Delta\Pi_{-1}$
$[1-d(1-v)]\Delta P_{-1} + d(1-v)\Delta\Pi_{-1}$
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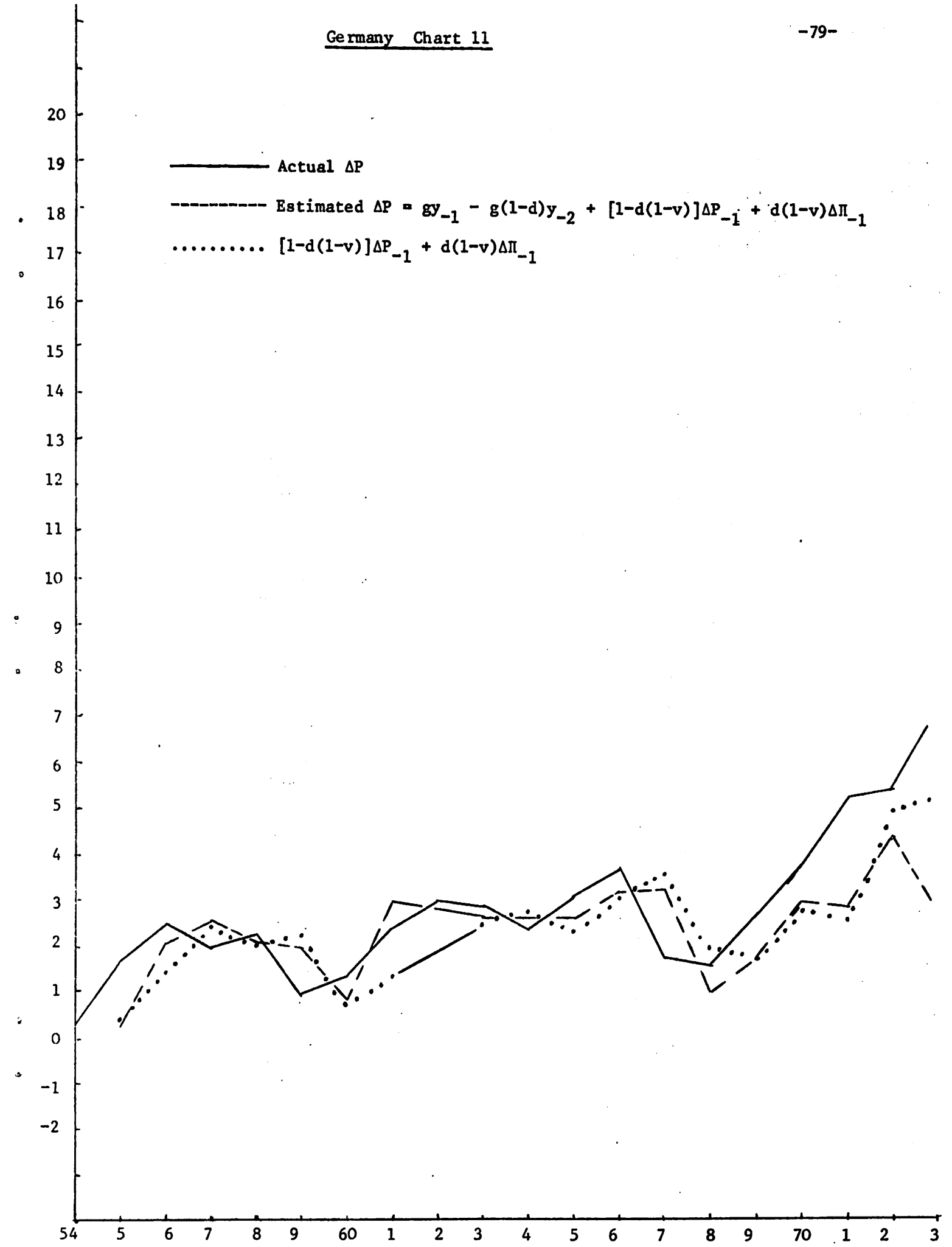
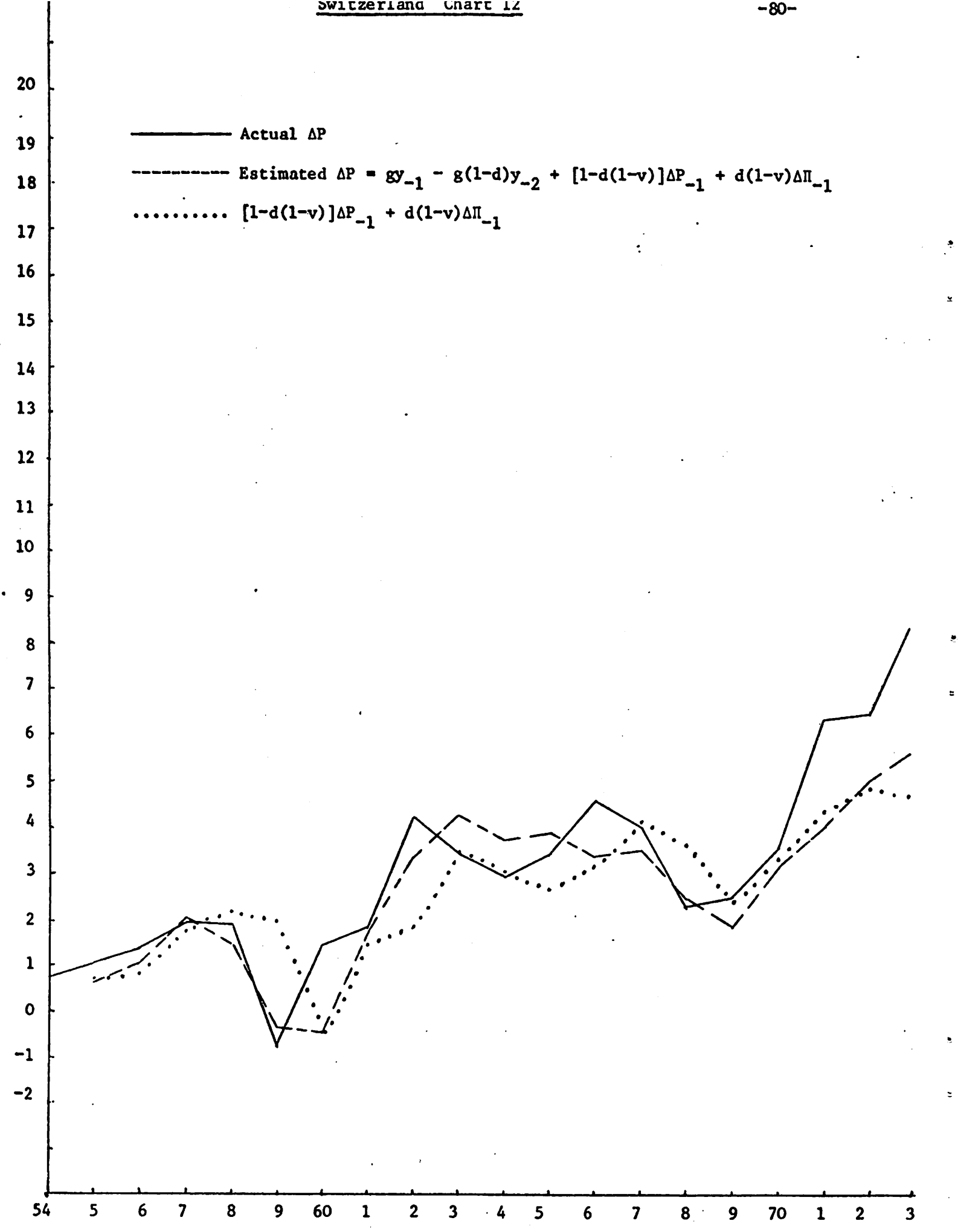
Germany Chart 11



Switzerland Chart 12



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