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THEORETICAL DEVELOPMENTS IN THE LIGHT OF
MACROECONOMIC POLICY AND EMPIRICAL RESEARCH

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ABSTRACT

The paper surveys the macroeconomic literature of the last decade with emphasis on the implications of the New Classical and Rational Expectations critiques for the Keynesian paradigm and the role of macro policies. This is done on the background of the main macro developments of the 1970's and 1980's as well as the specific lessons of recent high (chronic) inflation processes.

The paper takes an eclectic view emphasizing a synthesis that is emerging in which the basic Keynesian view of the existence of market and price co-ordination failures as well as room for Pareto improving policy intervention are maintained. At the same time the theoretical underpinnings are undergoing substantial change mainly due to a 'rational expectations' (rather than 'new classical') reformulation. The new Theory of Economic Policy is also discussed and illustrated in terms of recent stabilization experience.

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I. Introduction*

Having been asked to give a paper in a survey session in which the first two papers are, respectively, devoted to the two main competing schools of thought in Macroeconomics I take it that I may be expected to serve as some kind of objective referee. I would therefore like to start with a certain personal disclaimer. Neither my upbringing as an economist nor my occasional involvement in policy advice and more recently, in some policy making, really qualify me for objectivity. I have been 'brain washed' early in life by Keynes's disciples in his own Cambridge College in the mid-1950's and subsequently spent a good number of years working on real trade and development, growth and public finance issues in a place and time in which even the research staff of the Central Bank worried more about structural disequilibria than for the supply of money.

Developments of the late sixties and early 1970's did, of course, make a sharp dent on one's image of the world. While viewed with some suspicion the monetarist model, especially in an international economics context, did have a considerable appeal. Then came the New Classical (not just the 'Rational Expectations') onslaught, having captured all the bright and young graduate students at U.S. top universities with its tremendous appeal in theoretical rigour and econometric applicability. Policy relevance was another matter, but who cares for that if the basic underlying belief is that there is little that macro policy can do anyway?

The subsequent dramatic developments of the 1970's have taught us the mistakes of both schools of thought and made it much easier for oneself to justify a point of view already dictated by occasional earlier sorties into macro policy advice-the advantages of eclecticism. Much of Keynesian

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Theory and policy implications has become obsolete and much of what rational expectations theory has taught us, in spite of its new classical guise, is there to stay and make macroeconomics a very different discipline from that which we were taught in our youth. But there is a basic sense in which I must confess to having remained a Keynesian, albeit an eclectic one. It is in the empirically based belief that there may be major markets that do not always clear, that co-ordination failures may play a major role and that a government may have an important Pareto improving role in the co-ordination game, even when or precisely because its behaviour forms part of private agents' information set.

From the point of view of Macroeconomics as a tool for policy there are two outstanding contributions which the rational expectations revolution has made - one is the Lucas' critique and all that goes with it in applied research. The other, related one, is the basic premise that individuals make the optimal use of information available to them, including their perception of government policy behaviour. It is this, and not the image of continuous market clearing and flexible prices, which seems to be the basis for the new macroeconomic synthesis.

What I hope to stress in the coming pages is the belief that past successful advances as well as the best path for macroeconomics to follow in the future is that which synthesizes results of scientific observations of the real world, including the lessons of successes and failures of actual policies, within sound theoretical constructs, irrespective of the 'school of thought' from which they originate initially. In the heat of doctrinal debates participants may sometimes forget that the ultimate objective of doing macroeconomics is to understand how the real world ticks and to try, to the extent that this is possible, to improve its functioning.

The main ultimate test for a theory is its ability to explain facts and/or form the basis for successful policy. This criterion should, of course, not be interpreted too narrowly. There may be deeper layers of pure theory like microfoundation building blocks which need not be individually testable except through the testability of the aggregate phenomena to which their logic leads. Moreover, even the most pragmatic policy maker (or the advisor who whispers in his ears) who in practice more

often than not bases decisions on his own (or his advisor's) intuition, should benefit from learning of some new pure theoretical insights. Intuition, after all, is the complex embodiment of knowledge and facts processed through both formal and informal 'models'.¹⁾ However, it is difficult to envisage an optimal process of search for the 'right' theories and the building up of the 'relevant' policy intuition as anything other than eclectic.²⁾ It is, incidentally, a two-way process, in which a certain policy, based on some vague intuition, may be successful, and will only later receive the supporting theory.

The history of Macroeconomics abounds with examples of major advances made into the mainstream of macroeconomic theory by researchers from outside a given school of thought challenging one of its major premises. Likewise there are examples where a doctrinaire approach by the priests of a dominant creed has hindered progress for a while. In Macroeconomic Theory as elsewhere there are fashions to which one is expected to conform. Also, the quest for analytical rigour, in itself a virtue, may sometimes keep certain observed phenomena or proven policy tools out of bounds of acceptable theory. Examples are the fall and rise of the wage-price spiral, which will be discussed below, or the use of price controls or the role, more generally, of incomes policy as a legitimate supply management tool. Likewise there are examples of policy tools that have been totally discredited because of failing, for good reason, in one context while they might work in a different setting. An example of the latter is the use of the exchange rate as a stabilising device.

- 1) To this one must add Keynes's famous dictum about the practical men who "are usually the slaves of some defunct economist" anyway.
- 2) Here is a brief diversion - Paul Samuelson has told a story about his teacher Gotfried Haberler defending being eclectic against the critics of eclecticism with their more exciting views: "how do we know that Mother Nature is not herself eclectic?" Quoted in P. Samuelson, "Policy Advising in Economics", Challenge, March-April 1978.

Finally, while there is a sufficiently broad body of macro theory that is commonly relevant in most economies, it is important to keep in mind that macroeconomics is about an economy with certain markets and a certain institutional set-up and the structure of markets and institutions may differ substantially for different economies. This is an obvious point, but it is one that tends to be overlooked especially since the distributions of macroeconomists and of macroeconomic problems across countries are not the same.

In the coming sections we shall illustrate some of the issues mentioned here from developments in certain selected areas of macroeconomics. Our examples will by no means do justice to the subject nor do I feel sufficiently updated to deal with all sub-branches of this highly proliferating field.³⁾ Moreover, there are by now a number of recent surveys that go into the various areas in greater detail. I will attempt to illustrate a particular point of view and concentrate mainly on the product and labour markets where most of the issues and debates have arisen. The next section briefly reminds us that there are important contributions of the 1950's and 1960's that have remained almost intact. We then go into a discussion of price adjustment and the behaviour of product markets (Section III), followed by a discussion of what can be learnt from extreme inflationary phenomena (Section IV). Section V takes up labour market behaviour and the problem of persistent unemployment. Section VI discusses some of the recent developments in the theory of economic policy and the paper ends with concluding remarks.

3) It is enough to be away from academia for a very few years, which happens to be my case, to lose track of some of the more detailed developments. I will, however, try to use one object of my detour, high inflation and its cure, as a practical laboratory experiment to illustrate some of the doctrinal issues.

II. The Constructive Synthesis of the 1950's and 1960's

Having come through the turbulent developments of macroeconomics of the last 15 years, with the field still licking its wounds but just about beginning to build up a new synthesis, it is worth remembering that there is a considerable body of macroeconomic theory, based on sound empirical basis and having important policy content, which evolved out of what used to be called the Keynesian neoclassical synthesis of the pre 1970 era.⁴⁾ Much of what goes into the Theory of household and firm demand for consumption, investment and financial assets, the basic ingredients of the ISLM part of the standard textbook model, are still with us, live and kicking. The advent of rational expectations has certainly left its mark there too, but the essence of the careful portfolio choice approach developed by Milton Friedman (1957), James Tobin (1958) and many others has survived the onslaught in terms of both empirical relevance and theoretical rigour.

I would single out two contributions that impressed as being a most successful way of attacking a major building block of Keynesian Theory, taking it entirely apart and replacing it with what looked like a path-breaking advance. The first one was Milton Friedman's permanent income hypothesis in consumption theory (not to ignore Modigliani's life cycle parallel). It was the most beautiful example of a seeming empirical paradox (the differing consumption patterns coming out of time series and cross section data) resolved by a truly innovative idea, the distinction between permanent and transitory income. This has led to a whole body of literature with further developments involving intertemporal optimization, the introduction of liquidity constraints and many other fruitful insights (for a recent survey see Hall, 1987). The particularly notable aspect of this branch of macroeconomic research is the very close connection and synthesis achieved between theoretical rigour and empirical testing thereof. Needless to say, the policy implications for taxation and savings policy were immense.

4) An early major theoretical synthesis was given in Patinkin's (1965) book.

The other example is Tobin's liquidity preference theory, which has laid the foundations for both theoretical and empirical research on the demand for money and other financial assets. In the same vein one might mention the various contributions to the theory of investment demand, including both the neoclassical model (Jorgenson, Eisner, etc) and the later developments following on Tobin's q-theory. All of these have been major improvements on the basic Keynesian model, they were based on sound theory, were empirically testable and had substantial policy relevance. The way they were developed was in the best scientific tradition. Finally, the advent of rational expectations did introduce some major change in these parts of the Keynesian Model but did not have the devastating implications that other parts of macrotheory subsequently underwent.

III. Price adjustment and the Product Market

The subject of empirical and theoretical analysis of the process of price adjustment could provide one of the most fascinating topics for the study of the history and sociology of economic science. Wage stickiness and price inertia have been a centerpiece of Keynesian thinking, their existence or non-existence matters for key policy issues such as the validity of a short-term inflation unemployment trade-off or the way to fight high inflation. It has been the main object of attack of the new-classical school, the fiercest attack on Keynesian Theory since its inception. For a time the attack looked so successful that the baby was just about thrown away with the bath water.

Looking back over the last decade one can say that the intensity of the attack was not justified on either empirical or even intuitively-theoretical grounds. At the same time it found the object of attack weak in its analytical micro-foundations, and for that reason had far reaching implications for the way macroeconomic theory and econometric research was to proceed henceforth. The main shift of emphasis is in the

way available information is processed by the individual market agent, including its perception of expected government policy. This widening of the information structure is perfectly legitimate in its own right. The problem only was that this shift came under the heading of an all out attack on elements of a real world image of wage and price adjustment which can neither be rejected outright nor were they substituted by more valid behavioural models. The final result seems to be that some of the basic empirical findings have remained intact, yet considerable effort is being put into the reconstruction of a theory which, once the shift in the information structure is made, will show most of the previous applications to stand firm. This is a worthwhile effort, no doubt, but it is important to stress that in some major parts at least, the policy implications remain unchanged although the theoretical grounding is undergoing major change. It is almost as if, like in the well known anecdote, a person suffering from bed-wetting goes to the psychiatrist to be cured. His perception of life undergoes dramatic change. He continues to bed-wet but he is now perfectly happy or, at least, is no longer ashamed of it.

The wage-price mechanism that was prevalent in the empirical and theoretical literature in the U.S. by the beginning of the 1970's and which became the subject of attack by Lucas (1973), Sargent and Wallace (1975), and others centered around the Phillips curve in a way that made it particularly vulnerable to attack not only on rational expectations grounds. By using a rather crude closed economy labour cost-plus specification for the product market no distinction was made between wage and price adjustment. Thus the Phillips curve for wages became the Phillips curve for prices which, of course, performed miserably once the oil and commodity shocks came, quite apart from the Lucas (1976) critique about the vulnerability of seemingly 'structural' parameters to the change in policy regime.

To clarify the point one may use one of several versions of the Philips curve that was popular in the early 1970's. Suppose we start from a version of what was originally a wage adjustment equation under disequilibrium:

$$w = \alpha\pi_{-1} + (1-\alpha)\pi^e - (U-U^N) \quad (1)$$
$$0 \leq \alpha \leq 1$$

where w = rate of nominal wage inflation

π = rate of inflation

π^e = expected rate of inflation (to be specified)

U = rate of unemployment

U^N = natural rate of unemployment.

Next assume a closed economy and fixed profit margin. Thus

$$\pi = w \quad (2)$$

and (1) becomes

$$\pi = \alpha\pi_{-1} + (1-\alpha)\pi^e - (U-U^N) \quad (1')$$

Now assume a policy rule for the (expected) rate of growth of money (μ)

$$\mu = \mu_0 + \mu_1(U - U^N) \quad (3)$$

We get

$$\pi = \alpha\pi_{-1} + (1-\alpha)\pi^e + c(\mu - \mu^0) \quad (4)$$

where $c = \mu_1^{-1}$

In equilibrium $\mu = \pi = \pi^e = \mu_0$ and $U = U^N$

Suppose now that there is a demand short-fall leading to temporary $U > U^N$ and $\pi < \mu_0$ in (1'). By temporarily raising $\mu > \mu_0$, π is raised above π^e enabling a fall in U back to U^N while π gradually rises back to μ_0 . This could have been a typical application of the Phillips curve by the beginning of the 1970's. The possibility of a short-term trade-off between inflation and unemployment hinged on the assumption that $\alpha > 0$ (wage inertia) or, if $\alpha = 0$, that expectations (π^e) are adaptive.

Now suppose that $\alpha = 0$ and that π^e is rationally expected. We now know that in the formation of expectations the policy rule (3) will be taken into account and that in that case no trade-off exists. The only thing that monetary policy can do in that case is to correct for unanticipated shocks to prices or output, because any other change will immediately affect π^e along with π (the policy ineffectiveness hypothesis). Moreover, the use of an empirically estimated equation like (1') for policy evaluation is faulty when π^e is not independent of the policy rule (the Lucas critique).

This critique was indeed very powerful. The problem, however, is that equation (1') failed to explain inflationary developments in the 1970's and also failed as a policy tool for reasons that have very little to do with the rational expectations revolution. The main fault was the mental switch from a wage adjustment equation (1), which may have remained valid as a disequilibrium relationship for the Labour Market, to a price equation (1') which is an invalid description for the Product Market⁵⁾, especially under supply shocks. In other words, it is equation (2) which may be at fault.

Anybody who was living and working in an open economy would have known long ago that a workable product market specification of price adjustment, replacing equation (2), should at least have to involve import prices as part of costs and aggregate supply. If, in fact, prices are determined in terms of an aggregate demand and aggregate supply equilibrium for an open economy, the rate of inflation could be specified more generally as a linearly homogenous function of wages, the exchange rate and money, plus other remaining real shock variables.

Consider a conventional open-economy commodity market (with intermediate imports):

Aggregate Supply (AS) and Aggregate Demand (AD) balance gives:

$$Y^s \left(\frac{W}{P}, \frac{P^*_{nE}}{P}; A_s \right) = Y^d \left(\frac{M}{P}, \frac{EP^*}{P}; A_d \right) \quad (5)$$

5) One step further was to turn the equation on its head, replace $(U-U^N)$ by y and obtain what was to become the Lucas "output-supply equation".

Where P = price level, W = nominal wages, E = exchange rate, M = money,

P^*_n = Exogenous imported input prices, P^* = Exogenous price of competing exports;

A_s = Supply shifts (capital stock, productivity, world import prices, wages, taxes, etc.);

A_d = Demand shifts (fiscal variables, world demand and interest rates, etc.)

Log-linearizing (2.1) and considering changes over time we get:

$$\pi = a_1 w + a_2 \varepsilon + a_3 \mu + v \quad (6)$$

where

$\pi = P/P =$ rate of inflation

$w = \dot{W}/W =$ wage inflation

$\varepsilon = \dot{E}/E =$ rate of devaluation

$\mu = \dot{M}/M =$ rate of monetary expansion

$v =$ supply and demand shocks

$a_1 + a_2 + a_3 = 1$, by homogeneity of (2.1)

Equation (2.2) may be rewritten in the form of an inflation acceleration equation:

$$\pi - \pi_{-1} = a_1 (w - \pi_{-1}) + a_2 (\varepsilon - \pi_{-1}) + a_3 (\mu - \pi_{-1}) + v$$

To the basic underlying price adjustment equation one could append adjustment rules for one or more of the three underlying nominal variables (e.g. monetary accomodation for m , or a crawling peg rule for e , plus some version of a Phillips curve for w), as one of several ways for showing inertia in price adjustment.

Consider again the case of a closed economy ($a_2 = 0$, $a_1 + a_3 = 1$). Suppose $w = \pi_{-1}$ (full COLA, leaving out expectations and unemployment effects). We get

$$\pi = (1-a_3) \pi_{-1} + a_3 \mu + v \quad (7)$$

Here a money growth rule is the price mover and inertia comes from COLA.

Now consider the open economy and assume, for simplicity

$$w = \phi \pi_{-1} + (1-\phi) \varepsilon \text{ (wage adjustment)}$$

$$\mu = \sigma \pi_{-1} + (1-\sigma) \varepsilon \text{ (monetary accomodation)}$$

We get:

$$\pi = \delta \pi_{-1} + (1-\delta) \varepsilon + v \quad (8)$$

where $\delta = a_1 \phi + a_3 \sigma$

Here an exchange rate rule will be the prime mover of inflation.

While there are econometric issues that we are ignoring here, the fact remains that various versions of the price equation (6), in combination with a wage adjustment equation like (1), have been successfully used in numerous empirical studies of inflation in open economies in the 1950's and 60's. It has also successfully survived the analysis of differential inflation rates in the industrial countries during the great supply shocks of the 1970's, a test which the above mentioned simple Phillips curve(1') could not pass, for reasons that have nothing to do with the rational expectations critique.

I shall return to the open economy version of the inflation equations below, since they can be used to illustrate many of the points of the debate about monetary policy that has mainly been raging in the U.S. with exchange rate policy replacing monetary policy in an open economy context. But first let us return to the closed economy 'mainstream'.

Two major implications appeared in the Lucas et al attack on the Phillips curve paradigm. Once you assume that agents form their expectations taking the observed policy rule into account the only short-term trade-off there may be between inflation and unemployment is that due to surprise or unanticipated inflation. Monetary policy intervention is thus bound to be ineffective in changing output and employment even in the short-run, and a change in a monetary rule will show immediately in a correspondingly changed rate of inflation. The second implication, which in a way has a much more profound effect on the way econometric results are to be interpreted for policy, is the Lucas critique. What seems to us in the data as a structural parameter in the inflationary process may be entirely dependent on the policy rule and by properly incorporating the agents' perception of that rule the parameter is no longer policy invariant.

It could be argued that any sensible user of an econometric model who was fully aware of the underlying theory, must have known, from the early days of modern Econometrics and long before Lucas, that when there is a change in policy regime over the sample period, a suitable shift in the relevant estimable parameters must be allowed for. Lucas's important contribution in the context in which it was made, however, highlighted the particular problem arising from the shift of emphasis in the specification of rationality in expectations behaviour, which hitherto tended to concentrate on backward looking, adaptive, and therefore largely policy invariant, expectations. The relationship between theory, econometric testing thereof and the formulation of macro policy models underwent a major change.

It is somewhat ironic that the attack had a major effect on the way applied research would be conducted henceforth but actually failed in what was its major objective, the policy ineffectiveness hypothesis. Barro's (1978) empirical results, purporting to show that only unanticipated changes in money affected output were later refuted by Gordon (1982).

Mishkin (1983) and others and the existence of nominal price rigidities was recently successfully tested for the U.S. by Poterba, Rotemberg and Summers (1986). The empirically based Keynesian intuition, that nominal wages and prices are usually sticky, has so far withstood the attack and has thus left the equilibrium, flexible price, new classical approach without the devastating practical policy implication that it had originally set out as its main objective. ⁶⁾

If wage and price stickiness seems an empirical reality but its existing theoretical foundation was not sound enough, given the new rational expectations emphasis, the research effort was to turn in the direction of divorce of the applied proven results from the existing theory and finding a way of a new marriage of nominal rigidities with a rational expectations approach. There have been many important theoretical developments, only a few of which I will mention here, but it must be observed that in terms of a real world image or actual policy implications so far this is an effort in the direction of bolstering the microfoundations, and not one of any revolutionary policy implications relative to what 'intuition' would tell us anyway. Only the future will tell whether there is more to come.

The first authors to develop models in which nominal rigidities can be squared within a forward-looking rational expectations approach were Fischer (1977) and Taylor (1980). In these models the nominal wage is preset so as to achieve, on expectation, constant real wage and employment while prices are flexible and monetary policy for the current period is not known by the wage earners in advance. Thus a money shock may increase prices and output through a temporary reduction in real wages. By having nominal wages predetermined for a longer period than policy and with wage setting staggered for different groups in the labour force, nominal inertia and a case for activist monetary policy are established.

6) A related development with possibly more profound implications for the theory of economic policy is the rules versus discretion debate. That will be taken up in section VI.

While these models gave an ingenious justification of nominal rigidities within a rational expectations setting of wage contracts, it does raise a number of problems not the least of which is the exogeneity of the contract length with respect to the rate of inflation. We know from empirical observation that even with costs of adjustment of contracts the contract length as well as the nature of staggering may change substantially with the rate of inflation (an example of changing COLA arrangements under high inflation is mentioned below).

Quite apart from the development of various models of wage adjustment in the labour market which will be further discussed in Section V., there has been a substantial independent attempt to refine the analysis of price rigidity in the commodity market. The point of departure in most of these models is a monopolistic competition model, primarily developed by Blanchard and Kiyotaki (1986)⁷⁾, in which there are n imperfectly competitive producers of differentiated products (and likewise for subsequent application there are m imperfectly competitive suppliers of labour). With all producers facing identical demand curves in terms of their relative price P_i/P and aggregate M/P the equilibrium is one in which all $P_i=P$ but the price level P is above the perfectly competitive one with M/P and output below that and therefore Pareto inferior. This structure implies an externality for any individual producer wanting to reduce his own price, which will make for nominal rigidity if there are even small "menu costs" of adjustment and thus an increase in money will show more in output than in prices.

Other developments in the same general area have to do with more refined models of price staggering structures such as Calvo's (1982), which he has subsequently also applied in an open economy exchange rate adjustment setting (1983). Then there is a whole new recent branch of research, mostly connected with the Blanchard-Kiyotaki model, in which

7) For an account of this model and related recent literature see also the survey by Blanchard (1988), which is extremely useful. See also a survey of work on micro-foundations by Rotemberg (1987). There has been a new classical reconstruction effort based on imperfect information, including intertemporal substitution in labour supply, which will not be taken up here.

the issue of equilibrium staggering or synchronisation is taken up as a co-ordination problem among firms.

A particularly illuminating recent model is that by Ball and Romer (1987). The paper introduces the possibility of multiple equilibria, both full adjustment of prices in response to a money shock and complete non-adjustment as well as intermediate equilibrium degrees of nominal price rigidities for a distribution of shocks. There is "strategic complementarity", in that one producer's incentive to adjust prices is greater if other producers adjust. Also, heterogeneity among price setters leads to equilibria in which some prices adjust and others do not. Welfare will be higher in the low rigidity equilibria which implies a role for government intervention to move the economy to a superior equilibrium. Practical application for policy implies that incentives for firms to sign shorter contracts or adopt greater indexation will lead to an equilibrium with less nominal rigidity. Such intervention could also be temporary or apply to only part of the market. The rest of the time (or the rest of) the private sector will take of itself. Below we shall see the relevance of synchronisation or co-ordination devices as well as the real life relevance of multiple equilibria in the context of a high inflation process in an open economy.

I will end the discussion in this section by returning to the issue of empirical aggregate price adjustment equations under sticky wages and prices. With the advent of rational expectations, we have seen, the wage price spiral of the 50's and 60's became passe. Moreover, under the new classical economics view of the world it just could not exist. In theory at least, that is; in practice the aggregate price equations, inertia inclusive, were working quite well.⁸⁾

8) One is reminded of the countryman who comes to the city and visits the zoo for the first time in his life. Upon being shown a zebra he looks at it for a long time. Finally he utters: "an animal with white and black stripes...hm...such an animal does not exist!".

Using the above mentioned monopolistic competition model Blanchard (1986) has worked out an ingenious wage and price staggering model with rational expectations to reproduce an inflationary spiral equation (7) for a closed economy. The essence of the model is the assumption that prices are set in advance for two periods and likewise wages, except that these decisions are staggered (the device that is used is to have one of the two set in even periods of time and the other in uneven periods). This asynchronization is enough to give a rational expectations solution price adjustment equation which looks very much like equation (7), derivable from the more simple minded backward looking pre- revolutionary days.

In an interesting extension of this model Zeira (1987) points out the importance of taking into account a positive time discount which defines the inflationary wedge between real wages from the point of view of workers and producers and also looks at the effect of alternative monetary rules including an extension to the open economy where costs include both labour and materials. Upon a rational expectations solution of the model, assuming monetary accomodation, an equation exactly like (8) emerges.⁹

What these models show is that you can get inertia and a wage price spiral in a forward looking framework . The models suffer from having the asynchronisation exogenously determined, while one would assume that this itself would not be independent of the inflationary process. Also there is the empirical question of how important the inertia coming from that component really is. I believe it is the actual backward linkage provided by institutional arrangements (such as COLA or the crawling peg) which determine the extent of actual inertia. That linkage is, of course, not independent of the rate of inflation, as we shall argue again below.

9) Another recent paper by Helpman and Leiderman (1987) works out a non-linear version of the Blanchard (1986) model. The theoretical analysis is interesting but the brief empirical application purporting to show that there was no inertia in the Israeli inflation appears erroneous.

IV. What can be learnt from hyper- or high-inflation experiences?

The inflationary experience in industrial countries to which the mainstream macroeconomic theories and policies are usually applied has to do with rates of inflation that may run up to no more than 1-2 percent a month on average, sometimes extending over a few years, with occasional higher peaks (of say 2-5 percent in one month). Even that rate has only been reached in times of extreme shocks like in the 1970's. Now consider rather brief historical experiences in which the monthly rate of inflation on average increased by between 20 and 1000 percent a month (with monthly peaks up to the order of 30,000 percent). Would there be any hope of learning anything from the latter about the former phenomenon?

Asking that question sounds about the same as asking a hydraulic engineer whether he could learn something about the laws of motion of water in the Mississippi River from observation of the frictionless free drop of water in the highest of Niagara Falls. Yet that is just what Sargent (1982) purported to do in what was otherwise an extremely illuminating study of the hyperinflation experience: "The four incidents we have studied are akin to laboratory experiments in which the elemental forces that cause and can be used to stop inflation are easiest to spot" [Sargent (1982), op. cit.]. That much may in part be true. The trouble is that this experience was also used by Sargent to deny the role of persistence and self-sustaining momentum, observed in the ordinary garden variety inflation. Extreme laboratory experiments can teach us a lot of things about a theory when stretched to the limit but one has to be very careful about the transfer of such lessons to where they just do not apply. Hyperinflation resembles an explosion in which ordinary money stops to function and contract length dwindles to single days and sometimes hours. It is precisely a phenomenon in which inertia almost by definition disappears.

Since the crisis of the 1970's we have had a number of new laboratory cases, in some Latin American countries (Argentina, Brazil, and more lately Mexico)¹⁰⁾ and in Israel, which are of a new and intermediate genre - high

10) Bolivia, by the above definitions and other attributes, was a proper hyperinflation. See Table.

(and persistent) inflation. Following the price shocks of the 1970's these economies have reached monthly rates of inflation of 5-8% (with peak monthly rates of 25-30%, so far...) extending over much longer periods of 8 years or more (see Table). A very strong torrent, unprecedented in the post-WW2 period, but neither a waterfall nor a slow-moving river. In many ways these are more interesting laboratory experiments than the hyperinflations because they start from the garden variety and only gradually approach a more extreme form of runaway inflation. In all probability ending high inflation, like ending hyperinflations, could not be done gradually (at least in moving from 500 percent a year or more to the 20 percent range). Yet persistence and inertia are one of their key attributes, which a serious stabilisation program cannot ignore. It is precisely the development of inflation-proofing institutional arrangements which help the process to persist. Quite apart from having to deal with the fundamental causes of inflation (i.e. large fiscal deficits and monetary accomodation) a disinflation program must solve a price co-ordination problem, so as to avoid what would otherwise become fobiddingly high real transition costs.

Let us first discuss one aspect of the high inflation process which has recently received considerable theoretical attention, the possibility of dual inflation equilibria. For this purpose I will use and extend a simplified version of a seignorage model which Stan Fisher and I have been analysing (1985). ¹¹⁾

Consider first a closed economy in which the increment to the money base \dot{H} is a fixed percentage (d) of GNP. Denoting the rate of growth of the money base by θ ($= \dot{H}/H$) and its ratio per unit of output by h [$= H/(PY)$]

We have:

$$\frac{\dot{H}}{PY} = \left(\frac{\dot{H}}{H}\right) \cdot \left(\frac{H}{PY}\right) = \theta \cdot h = d \quad (9)$$

11) Various versions of the simple seignorage model have appeared in the literature, see e.g. Sargent and Wallace (1981), Liviatan (1984).

In steady state $\theta = \pi + n$ and we get

$$(\pi + n)h = d \quad (9')$$

Assume next that the demand for unit real base money $h(H/PY)$ depends negatively on π^e , where π^e stands for inflationary expectations or, subsequently, as we move to the open economy, the exchange rate. (Presently suppress the real rate of interest, as well as shifts in the demand for money or monetary policy.) Assume a semi-logarithmic (Cagan) demand function:

$$h = \exp(-a\pi^e). \quad (10)$$

Combining (9') with (10) we find that maximum seignorage revenue is given by:

$$d^0 = \text{Max} \{ \theta \exp[-a(\theta-n)] \} = a^{-1} \exp(a n - 1)$$

and the associated inflation rate is $\pi^0 = 1/a - n$.

If $d > d^0$ there is no steady state equilibrium (hyperinflation)

For $d=d^0$ or $d < d^0$ there is a unique steady state.

If $0 < d < d^0$ there are two steady state equilibria (A,B in figure A), which we shall consider as an illustration for the case of high inflation. Steady state equilibria may shift due to changes in d , n or shifts in $h(\)$.

Now consider dynamics under adaptive adjustment of π_e .

$$\dot{\pi}^e = \beta(\pi - \pi^e). \quad (11)$$

Time differentiation of equation (10) gives

$$\theta - \pi - n = -a\dot{\pi}^e. \quad (12)$$

Substituting for π from equation (11) gives the equation of motion for π^e :

$$\dot{\pi}^* = (1 - \alpha\beta)^{-1} \beta (\theta - n - \pi^*) \quad (13)$$

where $\theta = d \exp(\alpha\pi^*)$

For $\beta < 1/\alpha$ A is stable, B unstable

$\beta > 1/\alpha$ A is unstable, B stable

The latter case is also relevant when $\beta \rightarrow \infty$ (or perfect foresight) in which case (8) becomes

$$\dot{\pi} = \alpha^{-1} (\pi + n - \theta) \quad (8a)$$

Next consider the variable coefficient case $\beta = \beta(\pi)$ with $\beta' > 0$ where $\beta(\pi^*) = 1/\alpha$, π^* = threshold inflation rate. We have the following possibilities:

(a) $\pi_A < \pi_B < \pi^*$ A stable, B unstable.

(b) $\pi^* < \pi_A < \pi_B$ A unstable, B stable

(c) $\pi_A < \pi^* < \pi_B$ Both A and B are stable.

This last case becomes relevant once we reinterpret this model for an open economy in which money^e and foreign exchange holdings are close substitutes. Replace π^* by ϵ in the demand for money (10) and now assume that the actual adjustment of the exchange rate by the authorities follows a crawling peg rule, in which the rate of devaluation is adjusted (other than through shocks - see below) to the lag between the rate of wage inflation (w) and the rate of devaluation(ϵ):

$$\dot{\epsilon} = \beta_1 (w - \epsilon). \quad (14)$$

where $\beta_1 = \beta_1(\epsilon)$ and $\beta_1' > 0$

The rationale for this adjustment rule comes from the maintenance of competitive power in the export sector.

Next assume that wage adjustment follows the rule (we here leave out discrete time lags):

$$w = \Phi\pi + (1 - \Phi)\epsilon,$$

where Φ itself will rise with inflation and we may assume $\Phi'(\varepsilon) > 0$.

We get $w - \varepsilon = \Phi(\pi - \varepsilon)$. Substituting into equation (14) we have

$$\dot{\varepsilon} = \beta(\varepsilon)(\pi - \varepsilon), \quad (15)$$

where $\beta = \Phi \cdot \beta_1 = \beta(\varepsilon)$, and $\beta' > 0$

Equation (15) is the same as (11) with ε replacing π^* , where ε may be rationally expected.

Equation (15) describes a smooth exchange rate adjustment process, with no speculative attacks, in which no discrete devaluation of the exchange rate can take place. To add this element we can rewrite equation (15) as a difference equation and add a discrete jump variable J_t to it, in which form it can also be empirically estimated:

$$(15a) \quad \varepsilon_t - \varepsilon_{t-1} = \beta(\pi_{t-1} - \varepsilon_{t-1}) + J_t$$

where $\varepsilon_t = e_t - e_{t-1}$ $\pi_t = p_t - p_{t-1}$

$e_t = \log$ of exchange rate $p_t = \log$ of price level.

Combining (15a) with a price adjustment equation like (8) one can describe an exchange rate shock and accomodation process under high inflation.

Equation (15) is an example of a gradual adjustment process which is nonetheless consistent with a rational expectations approach. The fact that the underlying system may have two inflationary equilibria, both of which are quasi-stable, shows that it is the policy rule, in this case the rule of adjustment for the exchange rate, which may bring it about.¹²⁾

12) Upward jumps in J_t or downward shocks in the price equation (due to price and wage controls) may shift the system towards the upper or lower equilibria, respectively.

The upper equilibrium, which is an 'inefficient' equilibrium, exhibits attributes which one would associate with very high inflation, quick adjustment speeds, shortening of contract lengths (such as COLA agreements) and also what looks like 'perverse' behaviour of a cut in the budget leading to a higher rather than a lower inflation equilibrium.

It is worth pointing out that in all probability movement towards an upper equilibrium was an empirical reality in the higher phases of the Israeli inflation. There is clear empirical evidence of the elasticity of demand for money rising above unity when annual inflation rose over 100% (after 1979). It is not that the government volunteered to operate on the 'wrong' side of the Laffer curve (for the inflation tax), but the economy was pushed in that direction by a number of policy mistakes which then trapped the economy in a higher inflation (introduction of foreign exchange linked money, as part of a misfired 'liberalization' effort, also involving a large step devaluation without the accompanying fiscal restraint). Next, equation (15a) was estimated with a non-linear specification, establishing a cut-off inflation rate (for the Cagan condition) π^* of between 5 and 6 percent monthly inflation (75-100 percent annual rate).¹³⁾ In other words, there was an implicit threshold rate above which inflation was being pushed towards a high, inefficient, quasi-equilibrium (of the order of 700-1000% annual rate).

A corollary of this type of analysis is the need to view a sharp disinflation program in two different, though related, parts. One is the correction of fundamentals - a cut in the government deficit helps reduce foreign borrowing, relieve pressure from the exchange rate and shift the A-

13) The details are given in Bruno (1988). The order of magnitude for the borderline between an inflationary process that could be reversed gradually and 'high' inflation that cannot also conforms with intuition.

inflationary equilibrium to a low (or zero) rate. The other part of the program must insure that a synchronised jump to the lower inflation rate is in fact successfully carried out. This is the part that involves a temporary suspension of the COLA agreements, a freeze on the exchange rate and domestic credit, as well as supporting price controls (whose main function in the Israeli case was to get the unions into the bargain and obtain the 'right' expectational signals). All of these elements enable a co-ordinated drop in the inflation rate, and also help to make the newly established low level inflation rate stable.

There are many interesting features both of the high inflation process, as well as that of its elimination, which have a bearing on the price co-ordination literature which was briefly mentioned in the previous section. A major example is the advantage, in an open economy, of using the exchange rate, rather than the quantity of money, as the co-ordinating pivot (the exchange rate unifies all the tradable goods prices while the demand for money may be highly unstable, especially during stabilization).

In the context of our present discussion the most important lesson from this experience, as opposed to the hyperinflation experience which led to Sargent's conclusions, is the predominance of nominal inertia even at very high inflation (up to 20% monthly rates, say). This imparts an important role to synchronisation during rapid disinflation, making it a 'heterodox' rather than an orthodox shock therapy. The other almost obvious point is that when a system has more than one (stable) equilibrium there is room for policy to get the system out of one Pareto-inferior, to the 'better' equilibrium. Other lessons that have to do with the rules versus discretion debate will be mentioned below. Finally the case of heterodox stabilization which was tried out in a number of countries is one where the applied policy package was in many ways based on intuition and was moulded by trial and error. Once it has been shown to work in at least one case the theory is developing by which it could eventually be fully rationalized.¹⁴⁾

14) See also Helpman and Leiderman (1987).

V. The Labour Market and Persistent Unemployment ¹⁵⁾

The existence of imperfections in the functioning of labour markets was a dominant theme in much of the literature which lay at the interface of macro-theory and labour economics already before the 1970's, notably the contributions to search theory such as by Mortensen (1970) and Phelps (1970). The underlying macro forces, however, making for fluctuations in employment and economic activity were considered to lie predominantly on the aggregate demand side. The possibility of supply side induced unemployment could be admitted, but it was confined to long term growth (e.g. technological unemployment). While the literature on Less Developed economies had for a long time also considered more 'classical' types of unemployment due to rigid real wages and dual labour markets, this did not enter mainstream macroeconomics until after the oil and commodity price shocks of the 1970's.

It is a rather typical example of the natural tendency to apply the existing paradigm to a new phenomenon, the oil shocks, and only then discover that it does not work. When the oil crisis of 1973 first set in, the dominant issue at first sight seemed the petro-dollar recycling problem. With so much more purchasing power in the hands of the oil producers and the fall in real income and wealth causing unemployment in the economies of the major consumers, all that seemed to be required is to redress the world demand imbalance. If only one could channel the extra purchasing power in the form of expanded exports from the oil consumers to the oil producers the 'Keynesian' unemployment in the industrial economies would disappear. Only with time did it become clear that rising unemployment together with accelerating inflation in the mid- 1970's, was a result, first and foremost, of a shift in the aggregate commodity supply schedules of individual economies, hitherto a rather dormant component of the Keynesian short-term equilibrium.

15) Recent research on labour markets and macroeconomic theory is discussed much more extensively in the two papers by Mortensen and Bean-Layard in this Symposium. The present section surveys only a partial selection of issues.

A mere leftward shift of the aggregate supply schedule on account of the rising prices of material inputs is not enough to generate unemployment, however, even under sticky nominal wages. For that real wage rigidity is an essential component, empirically shown to be much more important in most of Europe than in the U.S., for example. To make things more complicated both theoretically and in particular, for empirical estimation, supply shocks did not seem to come by themselves. Both real income effects, macro policy reactions and the international repercussions on export demand superimposed obvious Keynesian effects on top of the newly discovered 'classical' unemployment shocks.¹⁶⁾ The conceptualisation of different unemployment regimes within the existing paradigm was facilitated through the previously developed and much discussed disequilibrium approach to the Keynesian model.¹⁷⁾

Much of the early attempt at empirical quantification of the 'classical' component of the unemployment rested on the simple notion of the 'real wage gap' (relative to labour productivity) measure. An update to 1983¹⁸⁾ showed that even in Europe, with time an increasing share of the

16) A systematic integration within the macro model is given in Bruno and Sachs (1985). To the short-run effect of real wage rigidity there is an added long-run effect coming from the profit squeeze and slowing down of capital accumulation, a subject extensively taken up by Malinvaud (1980).

17) Major contributions were Barro and Grossman (1971) and Malinvaud (1977), the latter resting on and simplifying, substantive french contributions by Benassy, Grandmont and others. A useful survey was given by Muellbauer and Portes (1978).

18) See Bruno and Sachs (1985). The update is given in Bruno (1986).

unemployment was due to aggregate demand shortfall rather than a high real wage per se even though the latter seemed to continue to play a important role in high real wage resistant countries like the UK and Belgium.

The wage gap concept had been rationalized with reference to a competitive market clearing equilibrium concept of full employment, while in the above mentioned estimates for the employment effect of real wages allowance was made for departure from market clearing. A recent theoretically more satisfactory analysis along similar lines was given by Coen and Hickman (1987) who explicitly assume an imperfect competition setting and look at the wage gap in terms of the relative price ratio of labour and capital and a more complete aggregate demand and aggregate supply estimable model, applied to four countries (U.S., U.K., Austria and Germany). The empirical results are not substantially different from the earlier ones, but stress again the increasing re-emergence of aggregate demand shortfall as the dominant element in the early 1980's.

Relative real wage rigidity, while employment tends to fluctuate, and the phenomenon of persistent unemployment have, over the last decade, given rise to a very extensive theoretical literature dealing with various aspects of labour market imperfections and institutional structure, which will be briefly mentioned.

Starting with Baily (1974) and Azariadis (1975) wage and employment behaviour under long term contracts was shown to lead to relatively stable contracted real wage, providing workers are more risk averse (and with less access to insurance markets) than their employers. Later developments centered around employment decisions by firms under asymmetric information between workers and firms (e.g. on perception of productivity shocks) showing that employment will be lower than under symmetric information.¹⁹⁾

19) Major contributions here were made by Hart (1983). For recent surveys of the contract literature see Rosen (1985), Stiglitz (1986).

Several writers have analyzed the role of union wage setting as a factor in real wage rigidity over the business cycle (e.g. Oswald, 1979; Grossman, 1982). McDonald and Solow (1981) have provided a series of models that focus on the wage-employment trade-off and outcomes that are likely to arise from wage bargaining, emphasizing the implications of demand shocks for real wage outcomes. The model can also be used to show that an optimizing union, with given size membership, may absorb an input price shock entirely in the form of reduced employment at given real wage, if the shock does not affect the elasticity of labour demand or the level of utility in unemployment.

A more recent theoretical development, in which the existence of unions plays an important role and which attempts to account for persistent unemployment, is the insider-outsider model. By controlling entry into employment union insiders may cause the real wage to rise above the market -clearing rate and thus keep unemployment from falling. The idea has been raised in the context of Australian unemployment by Gregory (1985), developed in a series of papers by Lindbeck and Snower (1984, 1986). It has recently been used by Blanchard and Summers (1986) to suggest that persistent European unemployment could be explained as a hysteresis phenomenon. The supply and demand shocks mentioned above would explain why unemployment increased the way it did, while the insider-outsider characteristic of the labour market explains why unemployment has stayed at persistently high levels. Unfortunately the empirical part of these analyses remains inconclusive as far as to the policy implications of such phenomenon. On the one hand it may call for supply management measures such as work-sharing and profit sharing programs (along Weitzman (1986) lines) as well as limitations on union control of entry. On the other hand it is not clear whether the NAIRU could be brought down and to what extent aggregate demand expansion could also be a solution. Presumably a combination of both is needed, but isn't that something that 'intuition' would tell us anyway?

A parallel development that should be mentioned in this context is the efficiency wage theory, another import from LDC development literature (Leibenstein, 1957) with contributions, amongst others, by Solow (1979), Akerloff and Yellen (1984). (For an excellent recent survey see Katz (1986)). Here the possibility of the real wage being paid in excess of the market clearing level rests on the assumption that productivity (and labour

morale, aversion to shirking, etc.) depends on the real wage. The model could be criticised on the grounds that some of the firm's objectives that are meant to rationalize a high wage could also be achieved by longer term employment relations (upwards sloping age-earnings profiles, internal promotion schemes, pensions etc). Imperfect observability of worker quality, namely an adverse selection argument, would also lead a firm to raise the wage so as to attract a higher quality pool of applicants.

The choice between the insider-outsider and the efficiency wage theory ultimately depends on the degree of importance that is attached in practice to imperfect information on part of firms or to workers' market power. These may differ across industries and countries and a great deal more empirical work needs to be done before one would be able to judge the practical macro policy relevance of the theory.

In the interdependent world of the 1980's it may be unrealistic to expect a solution of the unemployment problem within the confines of an individual country. Part of the answer may lie in a somewhat different, though related, field - that of international co-ordination of macroeconomic policies. What looks like a "classical" unemployment problem for a single country could be solved by co-ordinated "Keynesian" expansion by a group of countries, a subject that will not be taken up here. At the same time we know that countries differ in respect of unemployment and general macro-economic performance. What are the lessons that could be learnt from comparative studies of macroeconomic performance across countries, in relation to differences in wage setting structures? An interesting recent paper by Calmfors and Driffil (1987) has challenged the conventional wisdom by which there is a monotonic relationship between the degree of centralization of wage bargaining and the macroeconomic outcome. When that outcome is measured by an open economy analog of the conventional

misery index,²⁰⁾ they show that the relationship is rather hump-shaped. The best performance is at the two extremes of high centralization (e.g. Austria and the Nordic countries) or high decentralization (e.g. Japan, Switzerland and the U.S.) with the worst outcome at the intermediate level of centralization (e.g. Belgium, Netherlands).

What is interesting and original in this study is the attempt to give a theoretical model by which this empirical finding is rationalized. A stylized model economy is conceived consisting of many separate industries the goods of which are imperfect substitutes in demand. The goods may be aggregated into broader and broader groups with each group at one level treated as a single good at the next higher level. Goods from the same group are close substitutes while among different groups the more distant substitutes conform to longer distance along the branches of the industry tree. When industry unions amalgamate they always do so by forming coalitions between those in sectors producing the closest substitutes. Increased centralization is thus synonymous with climbing up the substitutability tree.

In this set-up the impact on wages with increasing centralization depends on two opposing forces. As unions get larger they acquire market power. A given money wage increase results in a larger output price rise the more sectors the union encompasses. The price rise is larger and thus also the incentive to raise money wages, the larger the elasticity of substitution between the goods produced by the cooperating sectors since this increases the cross effects in product demand. On the other hand the effect of the money wage rate on the aggregate price level works in the opposite direction. As unions get bigger the effect of the money wage on the aggregate price level increases and the real wage gains are reduced. Put differently, centralization can be seen as the progressive internalization of an externality. Using the authors' words "If, at the wage which maximizes each union's welfare when it acts independently, the

20) Here is another instance of limited generality of quite widespread macroeconomic measure. Instead of adding the unemployment rate only to the inflation rate as is common in the U.S. policy discussion, The GDP share of current account deficit is added in the present context.

marginal effect of an increase in its wage on the welfare of the other union is positive, then cooperation results in higher wages than independent actions and vice versa."

This argument rationalizes the hump shaped relationship between degree of centralization and the real wage rate. The way this fits into the comparison of change in economic performance between the pre-73 and post-73 world, is that in the earlier period economies were in full employment and real wages at more or less market clearing levels whereas in the underemployment situation of the 1970's and 80's labour markets were more likely to be thrown into a situation like the one described by the above model. The policy implication of all this is that a bit more or a bit less centralization for a country in the medium range may not by itself make a lot of difference.

VI. Credibility, Rules versus Discretion and the Theory of Economic Policy

A government that cannot tie its hands to a precommitted policy rule (such as follow a disinflation policy) will at each point in time make a short-run optimal decision, taking the private sector's reaction as given. The private sector, in turn, takes the government policy as given when it makes its own optimizing decisions. This discretionary, Nash equilibrium, outcome may on average, over time, be Pareto inferior to one in which a binding precommitment, or a co-operative outcome can be negotiated. But what about a government that seems to commit itself to a certain policy over more than one period and then finds it optimal to renege when the next period comes around? This, so-called, dynamic inconsistency problem (Kydländ and Prescott, 1977) has started a whole set of interesting papers by Barro and Gordon (1983a, 1983b) and several other authors.²¹⁾

One contribution of this literature, which so far has been entirely theoretical, was to give systematic rational content to concepts with which one has been reasoning only intuitively like policy credibility and the rules versus discretion issue. What may be a more important outcome is the systematic introduction of the idea that in a multi-period horizon governments may be less likely to act in dynamically inconsistent ways if there is an incentive to build-up a reputation and there is a cost attached to the loss of credibility. In this discussion findings and tools from repeated game theory, especially under incomplete information, have been fruitfully borrowed (notably Kreps and Wilson, 1982).

The standard reference in this literature is to the inflation-unemployment trade-off in the closed economy where the single period pay-of (or loss function) of the government combines a squared inflation and a linear (or squared) unemployment term and the multi-period extension is simply the discounted sum of these terms over time. The unemployment term is then replaced by the expectational Phillips curve. In

21) For recent surveys see Persson (1987) and Driffil (1987).

the one-period optimization (discretion) inflationary expectations, embedded in private sector contracts, are taken as given and the rational expectations, dynamically consistent, solution gives a positive inflation rate which is also the Nash equilibrium. A precommitment (rule) to a zero inflation policy which will in fact be believed and carried out is a Pareto superior outcome. Reneging on the promised zero inflation rate in the first period may give a short run gain in employment (this is the 'temptation' in Barro and Gordon (1983) terminology). The cost is the loss of credibility henceforth, leading the private sector to expect positive inflation and act accordingly. This is the 'enforcement' of the rule. Various games can be devised in which the government may regain its credibility by correcting its ways and producing the expected zero inflation rate next period. Some of the more interesting applications are those in which the private sector does not know what kind of government it has and must gradually learn its behaviour by applying Bayes' rule to the updating of their beliefs (Barro and Gordon, 1983; Backus and Driffil, 1985). What these studies show is that here too, as in the co-ordination problem discussed in Section IV, a multiplicity of possible equilibria exists. A co-operative solution, such as under centralized wage bargaining may, of course, facilitate matters.

The closed economy problem analyzed in the above studies implies an open economy analog, which has so far not been fully explored.²²⁾ Instead of looking at inflation and unemployment the relevant trade-off is between inflation and the current account (in present discounted stream form this amounts to the trade-off between inflation and foreign exchange reserves). The relevant policy variable here is the exchange rate while labour, assuming that it is highly organised, chooses a nominal wage rate so as to maximize some function of the real wage and employment.

22) Horn and Persson (1985) discuss an open economy union versus government bilateral monopoly model but only incorporate employment in the export industry rather than the current account or foreign exchange reserves in the objective function. Cukierman and Liviatan (1988) have also been studying the balance of payments inflation trade-off.

We may give two examples that are relevant to the rapid disinflation experience described in the previous section, in which the above type of theory may at least be descriptively relevant. Consider the case in which initially there is inflation at the rate π_0 and wages have been fully indexed (i.e., $w = \pi_{-1}$). Now the government faces the choice of moving at once to zero inflation. The cost, if the COLA agreement cannot be suspended (lack of credibility), is a permanent increase in the real wage level (and real appreciation of the exchange rate) causing a loss of foreign exchange receipts not only this period but also over the future. It can be shown that this cost will be less than the gain from disinflation (assuming an infinite horizon, for simplicity) if the inherited inflation rate is above the inflation rate that would be obtained under discretion. If one starts from an initial discretionary solution the decision to disinflate could be the result of an increase in the weight of the inflation term relative to exchange reserves in the welfare maximand which would now make it preferable to opt for disinflation. In this example we implicitly assume that once zero inflation has been achieved it is also believed since the COLA assumption will reduce the nominal wage inflation to zero from the second period onwards. The introduction of wage and price controls may be rationalized as a way of convincing labour of the government's serious intentions. The welfare cost of moving ahead without COLA suspension can be used as a basis for a bargained up-front wage compensation within an agreement by which the unions do, in fact, agree to suspend automatic COLA temporarily. This was in fact done in the Israeli case.

As a second example we may consider the dynamic game that has taken place in Israel between the government and labour once the initial stabilisation phase, including an exchange rate freeze, had been launched. Given the bad past government track record the private sector expected that a few months after the beginning of the program another exchange rate adjustment would take place. Workers demanded a wage increase and the employers, in anticipation of government exchange rate accommodation, granted it. At this point government resisted the temptation to devalue and thus gradually invested in its own reputation. Ex-post some industries had to reduce their nominal wage but overall the real wage nonetheless increased and export profitability in the course of 1986 deteriorated. In January 1987 a 10% devaluation was introduced within another tripartite agreement (involving a partial suspension of COLA) and again a precommitment to an exchange rate freeze, conditional on wage moderation, was announced. The

outcome for 1987 was better than for the previous year. Real wages have still been rising a bit faster than productivity but the gap in rates of change is closing and some major concerns have announced a nominal wage cut to avoid the loss in competitiveness. It is an example of a gradual learning cum credibility - building process in which the government attempts to show a. that it will not easily accommodate. b. that it will not use surprise inflation (i.e. "cheating" by devaluing without an agreed incomes policy component) to erode the real wage.

Another interesting development related to the time inconsistency literature lies on the borderline of macroeconomics and political theory and deals with questions such as the rationale for public deficits under two-party systems, and the effect that uncertainty of election outcomes may have on the business cycle. Much of this work is due to Alesina and Tabellini, such as, for example a recent paper (1987) that shows why it is hard to eliminate budget deficits even if there is a consensus that they are socially sub-optimal. In their model this arises from the fact that the costs of running current deficits are not fully internalized by today's voter, not because of his irrationality, but because of his awareness that future policy choices, after another election, might not reflect his preferences. The expected marginal disutility of having to reduce spending in the future, to repay the debt incurred to-day, is not sufficiently high. He thus votes in favour of fiscal deficits even though a benevolent "social planner" would choose to balance the budget. The paper also shows that current voters would prefer to precommit future governments to a balanced budget rule but would not want the rule to be binding on themselves.

The analysis is done within a neat model in which there are heterogeneous individuals with differing tastes on the production of two different public goods. Decision is by majority rule, and at the beginning of each period the group votes on how much to produce of each public good in that period but no precommitment can be made on production next period. Preferences are single peaked and the median voter property holds. The social planner would always choose to balance the budget but because of elections each period in which disagreement between present and future voters occurs a time inconsistency and a bias in favour of budget deficits arises.

In the context of the stabilisation programs mentioned in Section V the above type of reasoning could be applied in the other direction - why a comprehensive disinflation program undertaken within a democratic political system is more likely to succeed when two major political parties that otherwise disagree on most issues form a coalition government under which a balanced budget is more likely to be achieved (cf. the recent Israeli example).

VII. Concluding remarks

There are a number of policy related research areas which were left out of the present discussion. We have already mentioned international macro policy co-ordination. In this area a literature is developing within which some of the strategic considerations and game-theoretic tools, mentioned above in another context, have been applied. On the individual economy level there are various fiscal and monetary policy issues on which there is ongoing theoretical research. There is increasing interest in the role of credit rationing in financial markets arising from adverse selection of risky borrowers or moral hazard considerations, whereby high interest rates lead to the choice of riskier activities. From the point of view of conduct of monetary policy, there is a lot more theoretical and empirical work to be done on the role of financial intermediation in a world of rapidly changing institutions. This is a particularly vexing problem in countries with thin money and capital markets. These areas were left out of the present discussion, not because they are unimportant. They are just as important from a policy point of view. But this is not where the great debates have been raging.

Looking back in an attempt to evaluate what has been achieved in macroeconomic theory during the last 10-15 years the record is impressive but not unmixd. Take the narrow minded policy maker's point of view and suppose his policies were based only on the results of theoretical and empirical research based on the 'old' paradigm or known by the mid 70's. Would that lead him to any bigger mistakes than those that he would have made if all the new knowledge were embedded in the wisdom that the economic advisor, recently graduated from a top academic institution, would have whispered in his ears? Put in this form the answer, most probably, would be negative. Yet we know that very dramatic changes have been taking place in the underlying building blocks, mainly with the new ways of looking at

information processing by individual agents and the departure from perfect competition models. Our understanding of the endogenous role of economic policy in the system has certainly undergone substantial improvement even if most of the actual policies could just as well have been undertaken within the old model. Understanding in a better way what one is doing may very well be the first stage in the learning process on how it will be done differently in the future.

Macroeconomics as a field has made substantial progress over this period. It continues to be an exciting area in which a lot of new ideas and useful new insights keep coming up. It also seems to be at a stage in which a new synthesis is emerging between a 'Keynesian' view of markets and a 'rational expectations' view of the way in which their functioning could be improved through macro-policies. It is very likely that the next conference of this kind, ten years from now, would not have to start with separate papers on the two schools of thought between which the debate has been raging during the last decade. Natural selection will dictate the right (eclectic?) mix of the new paradigm.

Four Recent High Inflations (1970-1987) and the
Hyper-Inflations of the 1920s (1920-1924)

Comparative Statistics

	Average monthly rate (Std. dev.)	Peak monthly rate (date)	Number of months with infl. > 25%	No. of years with	
				Infl. > 50%	Infl. > 100%
Argentina	8.5 (7.3)	37.8 (3/76)	9	15	11
Brazil	4.9 (4.4)	27.2 (6/87)	2	8	5
Israel	4.7 (4:9)	27.5 (7/85)	1	9	7
Bolivia (81-87)	16.8 (26.8)	182.8 (2/85)	17	5	4

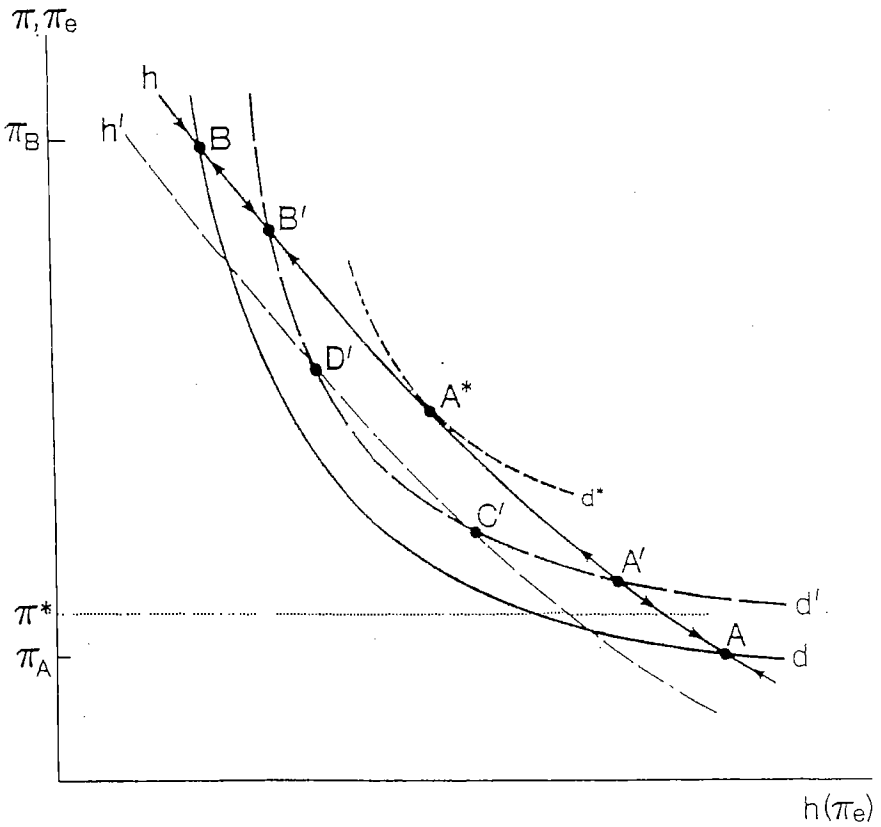
Germany	949 (4,471)	29,525 (10/23)	20	4	4
Poland	33 (51)	275 (10/23)	16	3	3
Austria	17 (30)	129 (8/22)	9	3	3
Hungary	17 (23)	98 (7/23)	9	3	3

Sources: Sargent (1982) and IFS.

Figure A. Government Finance, Base Money and Equilibrium Inflation

d-line: (4) $h\pi = d_1 = d - nv$

h-line: (5) $h = \exp(-\alpha\pi_e)$



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