ECONOMIC FORECASTING

Humbling Experiences of the 1970s

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ECONOMIC FORECASTING - HUMBLING EXPERIENCES OF THE 1970s

I have organized my remarks around five basic questions. What has gone wrong in the 1970s with economic forecasts? What have been the reactions of forecasters to these problems? Have there been any "confidence-builders" in the 1970s? Where do forecasters go from here? Will forecasters and decision-makers ever get together?

I. What has gone wrong?

I would be remiss if I did not give you some numbers in a talk about economic forecasting. I have chosen, for purpose of illustration, an economic forecast produced early in the 1970s for the years to 1980. This is the work reported in the Ninth Annual Review of the Economic Council of Canada which represented the most careful appraisal of Canada's economic prospects at that time. It is also a convenient one to pick since I was involved in the creation of the CANDIDE model that was used to produce these forecasts as well as being involved in the staff work for that Review. Thus, any apparent shortcomings are ones that I am liable for as well.

In 1973 and 1974, all forecasters were surprised by the extent of the commodity price explosion, starting in agricultural goods and then carrying on in primary metals and other materials. This was reinforced by the dramatic upward shift in world oil prices through OPEC. To my knowledge no one anticipated the magnitude of these changes, nor for that matter the subsequent

weakening of these same prices in 1975 and 1976. The "errors" of forecasting here led to underestimation of inflation in the 1970s.

The Ninth Annual Review forecasts for inflation were 2.3%/year for the 1971-80 period as measured by changes in the CPI. The broader indicator, the implicit deflator for Gross National Expenditure (GNE), was expected to increase 2.7%/year. In fact, the average inflation rate was 8%/year for the CPI measure and 8.7% for the GNE deflator.

Thus, unanticipated shocks to international prices and the subsequent inflationary forces triggered within the economy led to much higher inflation rates in the 1970s than were anticipated at the beginning of the decade.

As well the shocks and the policy responses to these shocks by governments around the world led to a major recession in 1975. Again the depth of this recession was generally missed because of the inability to anticipate the "perverse" policy reactions.

Nor did all econometric relations remain stable over the 1970s. For example, in three areas there were quite different responses of behaviour. Fertility rates, which had been declining from 1959 continued their downward movement throughout the 70s below any historical experience. Most economic and demographic forecasters treat fertility rates as exogenous -- that is determined outside of their models -- but this change nevertheless impacted perceptions of population growth in the 1970s.

The 1980 population forecast in the Ninth Annual Review was for about 25 million people; the actual was about 24 million. The shortfall can be attributed to less net immigration over the period (636,000 versus the 900,000 assumed), about 870 thousand fewer births, and slightly more people surviving in the 1970s due to reduced morbidity. The fertility rate used was the lowest one available at that time in the Statistics Canada population projections (2.3 births/woman), but the rate continued its decline to about 1.76 births/woman by 1980, substantially below that required for zero natural population growth (about 2.1 births/woman).

Another area in which changes in behavior were evident was labour force participation rates and, in particular, the growth in the participation rates of women. Throughout the 1970s we were continually revising upward estimates of the participation rates for women and reestimating the equations hoping to find some "economic variable" to explain the increase. By and large, however, econometrics lagged reality and the result was less rapid labour force growth forecasts than actually occurred.

In the Ninth Annual Review labour force growth was forecasted to grow at 2.7%/year or about 30% over the decade. The actual increase was 37.2% or 3.2%/year. In spite of an overestimation of population, the labour force was underestimated by about 600,000. Males in the labour force were overestimated by 100,000, but females were underestimated by 700,000. This was due

entirely to more rapid growth of the female participation rates than anticipated.

A third example of an apparent shift in the behavior of people is reflected by the personal savings rate -- the proportion of disposable income saved by people. This rate has been higher in the 1970s than was expected from the forecast. Some explanations for the higher savings rate in the 1970s focused on the impact of inflation on savings decisions. Others sought the explanation in various new savings schemes (RRSPs, RHOSPs, and the growth in earnings of company pension plans and other forms of institutionalized savings). I think we now have a better handle on this area although the very recent jumps again will test our equations. The effect of this underestimation of personal savings was forecasts of more robust economic growth than actually occurred as well as an overestimation of the impact of government expenditure and tax changes on the rest of the economy. The Ninth Annual Review forecast was for a personal savings rate of about 8% in the 1970s; the actual level was closer to 10% and, more recently, the rate has exceeded 13%. Many of the tax measures that enhanced personal savings occurred in the mid-1970s (the Registered Homeownership Savings Plan, increased RRSP limits); these were not anticipated in 1972.

While institutional changes may have impacted personal savings they were also much in evidence in other sectors. The entire restructuring of the international monetary system around

flexible exchange rates during the 1970s increased the volatility of price movements for some countries and changed the nature of the international linkages.

The external shock to oil prices led to several changes of institutions in Canada for determining domestic oil and gas prices -- both in the earlier seventies and more recently in the National Energy Program and subsequent federal-provincial energy agreements. These institutional changes in the determination of oil and gas prices in Canada required a major adjustment to most forecasts, both of prices and also of government revenues.

In late 1975, another major institutional change was announced in the form of the Anti-Inflation Board. In reaction to rapid increases in wages and prices and the fear that these changes might accelerate, wage-price controls were introduced. This again caused a major adjustment to forecasts for inflation during the 1976-1978 period. As well, the effects of the AIB on wage and price formation now must be brought into any empirical equations that include this time period.

In 1976, the Bank of Canada began a new process of conducting monetary policy according to some rules. By declaring bands of growth within which the money supply growth was to be contained, a new environment for all Canadians was created. In the ensuing years we received a good example of the differences between the physical sciences and social sciences in that people "learned" how to cope with such a system. Thus, this institutional change

subsequently triggered behavioural changes, which in turn made this rule less effective. Finally, the apparent linkage between demand for money and nominal income growth seemed to break down, at least temporarily, requiring a move to a different and as yet not explicit set of rules by the monetary authorities.

The adoption of these rules, coupled with similar institutional changes in the United States, has caused interest rates in 1980-82 to have substantially increased variance, as well as substantially higher levels than previous post-war experience. In turn we are finding out that in many parts of the economy previously estimated sensitivities of behaviour to interest rate changes have been underestimated. In particular, it would appear that we must now concern ourselves not only with the level of interest rates but their expected variation in understanding the behaviour of inventories, housing, and investment.

Forecasters also have their "puzzles". One particularly bothersome area has been the apparent slowdown in the rate of technological change or at least the observed slowdown in the growth of labour productivity. Why has this happened? At one of the recent American Economic Association meetings three different papers provided at least three explanations of the slowdown. One took the primary cause to be the weak economic growth in the post-1974 period with a secondary explanation associated with the reduction in the growth in research and development. A second study attributed 10 to 20% of the slowdown

to the increased regulatory burden (in the U.S.) on firms. And a third study identified the slowdown in the growth of the effective capital stock over the same period as the main cause. At this juncture we still have no generally accepted explanation and are left with a need for continued investigation and a hope that in the coming years it will become more apparent as to the division between the cyclical component and other difficulties. The impact of the slowdown in labour productivity growth has been traumatic. The net effect has been more rapid increases in prices and slower growth in real incomes in the period from 1975 on.

Total production (GNP) per employed person was expected in the Ninth Annual Review, to increase at an annual rate of 2.6%/year in the 1970s, slightly faster (3.0%/year) in the first half and 2.2%/year in the second half. In fact, this measure of productivity growth averaged less than 1%/year over the period 1971-80, with about 1.7% in the period through 1975 and virtually 0% in the period 1975-80.

In some areas, the Ninth Annual Review came quite close. The projected housing stock was 8,252,000; the actual was 8,356,000, an error of about 1%. Real disposable income per capita was expected to grow at 4.1%/year; the actual growth was 4.2%. This "closeness" was possible because of offsetting errors. The weakness in productivity growth was offset by more rapid labour force growth.

But the overall economy's performance was below standard in the 1970s. The projected real growth of 5.6%/year ended up at less than 4%/year over the decade. The 1980 unemployment rate target of 4% was actually 7.5%. I used the term "target" as a reminder that the conditional forecasts of the Ninth Annual Review were predicated on a basic assumption that the economy would move back to a "full" employment world, consistent with the goals that had been developed in the mid 1960s by the Economic Council of Canada. Perhaps the most distressing failure of the 1970s has been the change in public sector values that allowed the apparent abandonment of the goals of full employment and price stability.

What has gone wrong? It may not be the forecasts, but the actual economy and the sense of direction for economic policy. In addition to this contentious point, the four areas of difficulty for forecasters can be categorized as;

(1) unanticipated shocks (OPEC),

(2) changes in behavior (participation rates, fertility, and savings),

(3) changes in institutions (AIB, monetary policy rules),

(4) the puzzle of a slowdown in productivity growth.

II. How have forecasters in the 1970s and early 1980s responded to these problems?

Perhaps the most dramatic change that I have observed has been a change in the philosophy underlying forecasts. In the sixties and early seventies, it was believed that one could forecast the future. Behavioural relationships were thought to be stable and, subject to random shocks, one could calculate appropriate levels of GNP or some other economic variable in the future. But the seventies reminded us that, unlike the physical sciences, there are no constants in the social sciences. My current position is that the future is not forecastable. I often modify that statement to add the word "fortunately" as a reminder that there is nothing inevitable about the future. If we want to choose a target we can reach it, subject to certain constraints. The task that we have as forecasters is to examine a number of possible scenarios for the economy without necessarily picking one as the "most likely". These forecasts or scenarios are determined by the information that we have today and we might label one such scenario as a reference point or base case. But events change and the goal that we have as forecasters is to have available at any point in time a constellation of scenarios that might include the principal areas of change in the future. This philosophy has important implications for the way in which forecasts are used and developed.

The value of an econometric model of the economy becomes quite apparent when it is necessary to generate these alternative scenarios. The relative ease of changing assumptions, the enforced consistency, and the reproducibility of results all come to the foreground. We now change our forecasts much more quickly in response to changing circumstances. This is a good thing, overcoming a previous record of too much inertia. This approach also requires a much broader scan of the economic environment and concern for the determination of economic policy. That is, through our scenarios, we now are trying to anticipate as many shocks as we can. As well, we ask the question of how institutions will change over time.

There have also been changes on the technical side. The models behind the forecasts now have much more detailed energy sectors, and include many more rules for institutional relationships. As well, the models are more frequently reestimated or at least those parts of the models where behavioural changes are apparent by deviations in the historical period.

In essence, what we have seen is a growth in the "professionalism" of forecasters. There is now a continuous monitoring of the performance of models, better management of the databases, a more open attitude toward the comparison of properties of different models, and, in most cases, increased humility of the caretakers of such models.

III. What have been the "confidence-builders" in the 1970s?

It would be unfair to economic forecasters to describe the 1970s as a complete failure. With the substantial increase in energy prices there was a rather clear signal from most econometric studies that the price elasticity of energy demand was non-zero and that there would be a reduction in demand with higher relative prices. This has occurred and is an area where most economists differed from others in the early seventies. That is not to suggest that it was a unanimous view but perhaps it is fair to say that there was a greater agreement amongst forecasters that price would have its impact than amongst energy analysts and others.

As well, with the 1974-75 experience under our belt most economic forecasters anticipated the weakness in the U.S. and Canadian economies following the higher oil prices from OPEC in late 79 and early 80. In some cases the severity of the downturn was missed due to a misjudgement about the degree to which nominal interest rates would rise and the restrictive nature of monetary policy in both the U.S. and Canada. Nevertheless I would judge the forecast of weakness as a success for the forecasters, although a rather dismal failure from the viewpoint of our ability to manage our affairs.

More recently the weakness in OPEC prices had been anticipated as a possible scenario by most forecasters. Thus, the users of such forecasts were well-armed to consider the impact of such changes on inflation, real growth, and their own operations.

IV. Where do forecasters go from here?

One active area for continuing work is the development of better economic theory and data. One example of this is the need for a closer look at personal savings both with respect to the institutional structure of savings and the behaviour of "discretionary savings" as to its sensitivity to interest rates, changing income and increased uncertainty. Participation rates of persons in the labour force remain a fruitful area for theoretical improvement. In the last year a new phenomenon has appeared with a substantial drop in the participation rate of prime-age males (25-54). In the past this component was quite constant at about 95-96% of the total population. By the end of 1982 it had dropped below 93%. It would appear this can be explained by a long period of high unemployment but a closer look is warranted. The whole area of technological change and its impact on employment remains a fruitful area both for theoretical development as well as for developing an increasingly elaborate body of data. The role of research and development expenditures on technological change is an active area of investigation.

For those of us in longer term forecasting (10 to 20 years) there is an increasing focus on supply-side concerns of resource availability, incentive effects of tax systems and longer run consequences of the size of government debts. In a similar vein, it would be useful to examine the longer term consequences of particular kinds of monetary policy.

On the econometric model side, I expect to see continued growth in the size of models through more disaggregation and the inclusion of facets of the economy that now are either ignored or treated as "given" or exogenous.

In parallel there will be more sectoral models that will elaborate specific linkages and behaviour within "interesting" sectors of the economy. I have in mind here the linkage of energy supply behaviour with other parts of the energy sector and the modelling of basic industries that are either in trouble (e.g. textiles, footwear, chemicals, etc.) or industries with potential for substantial expansion such as certain parts of the services sector (software) and parts of manufacturing (communications equipment, aircraft, etc.).

One of the more challenging areas will be the elaboration of the conventional econometric models to include the possibility of new industries and emerging products. We have tagged this kind of an extension the creation of "phantom industries" which can be added to the economy by assumption and which compete with other goods and services, use resources and enter, in a consistent way, into the national accounting systems. It is perhaps beyond our ability at this stage to forecast what will, in fact, emerge as the new industries but we should be able to create scenarios to include them.

In Canada, with the emphasis on maintaining a federal state, the <u>spatial</u> dimensions of economic growth and policy are as

important as the national performance. Regional economic models are a necessary area for development. It is particularly desirable that this be done with a multi-regional approach in order that the tradeoffs between development in one region versus another are explicit.

Another area of substantial emphasis by forecasters will be on improved communications of the results of their work. This will require more scenarios, greater training of their users, and perhaps the inclusion of probability statements about the scenarios as a guide to the consumer. Such probability statements, however, will have to be Bayesian in nature, so as to respond to changing events.

V. Will forecasters and decision-makers ever get together?

Both strategic planners and forecasters live with a particularly frustrating reality. Two observable rules can be made. First, decisions are often made without the benefit of forecasts and plans. The corollary is that forecasts or plans do not necessarily lead to decisions. The first step toward recognizing the roles of decision-makers and forecasters is a recognition of these realities.

Decisions are made on the basis of a stock of knowledge in the mind of the decision-maker at the point in time in which a decision is required. The role of the forecaster/planner is to improve that stock of knowledge for the decision-maker over time. He must realize that he is competing with many other sources of information (and misinformation), each trying to become part of the mind-set of a decision-maker. Detailed econometric forecasts start with a "penalty". This arises from the more likely absorption of relational information or feelings or impressions by a decision-maker than numbers, quantitative estimates, etc. Nor is this helped by the poor communications of forecasts to decision-makers. It is much easier for a vocal, arm-waving statement of concern about government deficits to penetrate the decision-maker's mind than a clear-headed assessment of what we know and don't know in this area. Thus, forecasters will have to change their approach to decision-makers. The emphasis will have

to be on a long term program to build the information base of the decision-maker. At the same time forecasters will have to maintain their credibility as a source of information. In essence, what I am saying is that there is a need to communicate effectively.

The decision-maker, if he wants to go down this road, will have to do two things. First, he will have to listen and insist on clear communications. Then, he will have to start asking the right questions. An important step would be to recognize that the future is not forecastable and insist on scenarios, not single numbers. He will have to also stop asking questions or providing directives that say, "Confirm with your models that this decision I have made is a good one". Rather he will have to ask, "What is the impact of this policy on the economy; what are the pluses and minuses and what are the quantitative estimates of these?". In practice, the decision-maker will always face pluses and minuses and a value judgement will be required. Better that this be done in some form of framework that is consistent and reproducible.

Perhaps the most difficult thing for the decision-maker to do will be to submit his policies for testing through model simulations prior to their implementation. It is a long-accepted engineering principle that it is much more desirable to test the materials prior to their inclusion in a bridge! In essence, what I am suggesting is the non-destructive testing of policies before their implementation in the real world.

As forecasts become part of the decision-maker's mind-set we will have to confront an issue that has disturbed some forecasters for many years. Will forecasts of the economy affect decisions in such a way that the actual economy is destabilized? Or will forecasts be self-fulfilling? We don't have the answer to these questions. To date, the variety of forecasts and the tendency of decision-makers to ignore them, kept this issue in the background.

In closing I would like to summarize what we have covered. It has been recognized that the economy taught us much in the 1970s. In particular it reminded us of the inconstancy of economic relationships, the "learning" of the societies that make up this world economy, and the unexpected shocks that can occur. We have learned to cope with these changes and reminders. The tools being used today are better than they were ten years ago. The professionalism of the forecasters has dramatically increased. Our databases and theories are being extended and hold some promise of at least a better understanding of what has happened and the hope of an improved understanding of what could happen. The prospect for greater use of economic forecasts requires better communications by forecasters and better questions from decision-makers. Perhaps the title of this talk ten years from now can be, "Economic Forecasting: Its Modest Contributions in the 1980s".