Chapter 9: Conclusions and Suggestions for Further Work

The purpose of this dissertation was to estimate equations for the price-income side of an Interindustry Macroeconomic model of the U.S. economy. Since prior attempts to develop the price-income side of the model had resulted in equations that performed well only in limited cases, one goal of this dissertation was to estimate equations that would be robust with respect to changes in exogenous and endogenous variables in the model. As shown in Chapters 7 and 8, the estimated equations are successful in meeting that goal, since the results of the model from six different simulations are reasonable. In each case, the income equations, especially profits, responded in the expected direction and contributed to the stable properties of the model.

The approach for estimating income by industry equations in this study focused on two areas. First, rather than estimate an aggregate measure of capital income by industry, equations for the specific components of capital income were estimated. Second, the immediate pass-through of cost changes to prices traditional in IM models was relaxed. Each of these was implemented successfully. Estimating profits directly, rather than estimating total return to capital, resulted in equations that capture the cyclical response of

profits to both supply and demand changes. In addition, the relaxation of cost pass-through enriches the industry-specific behavior of the model. For example, since the Metals industry is oligopolistic, cost changes are passed more than fully through to prices initially, while in a more competitive industry, such as Wholesale and retail trade, complete pass-through of cost changes occurs with a lag.

One clear area for future research in developing the income by industry equations in the model is to expand the industry-specific behavioral equations for the non-profit components of capital income. For instance, recent advances in availability of investment data by industry should allow for estimation of industry-level equations for Capital Consumption Allowances.[1] Since Net interest payments are a large part of return to capital, the industry-level behavior of the model also would be enhanced by equations for net interest payments that are specific to each industry.

A second area for future research concerns the question of debt and equity financing that is not addressed by the profit equations in this study. Since the focus of this work was the role of profits in price determination, the effect of increased debt financing of capital spending on profits was not addressed. It is possible, however, to identify trends in the industry profit margins, and these

[1] See Meade (1990) for description of investment data by industry.

underlying trends may be explained by taking into account the ratio of debt to equity financing in each industry. The equation specification could be modified so that the trend of the profit margin depends on the split between debt and equity financing, while differences around the trend would depend on changes in costs and demand. A related issue concerns the relationship between capital utilization and profits. The present equation specification allows changes in demand to affect profits, but does not take into account whether the demand change occurs at high or low levels of capacity utilization. Future research on profits by industry could use industry-level investment data to determine capacity and capacity utilization for use in determining profits.

Another area for future research concerns the overall structure of the LIFT model and its behavior with respect to exchange rates. At present, LIFT assumes fixed exchange rates when alternate scenarios are run. It would be more realistic to make exchange rates endogenous. An alternative to making exchange rates endogenous would be to include a mechanism for insuring that relative foreign to domestic prices remain constant from one scenario to another. Alternatively, a mechanism introduced by Ralph Monaco (1984) could be re-activated in the model. The purpose of this mechanism was to move exchange rates by some scaler in response to changes in the trade balance from some pre-specified target balance. When

running alternate simulations, the target trade balance was defined as the trade balance from the Base forecast. The exchange rate scaler then moved to appreciate or depreciate the dollar against all currencies in response to the deviation of the trade balance from the target. This approach had the advantage of allowing short-run response of foreign trade to a shock, but a long-run return to the relative trade position of the Base forecast.

A final area for future research concerns the role of money in the LIFT model and its effect on inflation. In the scenarios in Chapter 7, especially the money supply shock, changes in the money supply do not turn completely into inflation. In including a money model in LIFT and examining the properties of the model, Ralph Monaco (1984) noticed that changes in money did not turn completely into inflation. Rather, the change in money supply growth resulted in large changes in the velocity of money. According to the Keynesian paradigm, increases in the money supply lead to lower interest rates, which stimulate demand and put upward pressure on prices. Monaco noted that the link between demand and prices was weak in LIFT and was partly responsible for the gap in money growth and inflation.

> This suggests that more of the price-income side equations should be re-estimated to assure that velocity behaves in a more reasonable fashion when the money supply changes. (p. 264)

This dissertation has improved the response of the price-income side of the model to demand changes, but changes in money supply still do not turn completely into inflation. Part of the explanation for this behavior concerns the relatively strong response of the demand side of the model to changes in prices, coupled with a weak response to changes in interest rates. An increase in the money supply leads to higher prices in the model through the wage equation (which depends on money balances), as well as through some small increases in demand from lower interest rates. As changes in the money supply lead to higher prices, however, demand is weakened almost immediately. The price response overshadows any positive stimulus from lower interest rates, and cuts off the behavioral chain of events described by the Keynesian paradigm. One weak link in that chain of events is the effect of interest rates on real spending. Traditionally, it is difficult to find significant interest-rate effects in determining investment or consumption, and the equations in LIFT are not interest-rate sensitive. An alternative to including interest rate effects might be to follow the path of Almon (1989) and use the concept of the availability of money. Including an interest rate effect, or the availability of money in the savings rate equation, for example, would insure that some positive stimulus from lower interest rates would increase demand and put upward pressure on

prices, as described by the Keynesian paradigm.

General Conclusions

The viability of the IM modeling approach in general, and the income-by-industry equations specifically, is demonstrated well by the comparison of a SAM multiplier model and LIFT in Chapter 8. The best use of an econometric model is as a simulation tool for conducting policy experiments or analyzing exogenous shocks to the economy. In two important respects, the IM approach is preferred to a SAM-based model that provides the same industry detail and accounting structure as the IM. First, the IM model clearly specifies the dynamic path for the reaction to a shock to the model. In analyzing policy simulations, the timing of the response may be the most important factor in evaluating the overall impact of the change. Second, the IM model includes the response of prices to changes in supply or demand in the model, and then the response of demand to those price changes. Since the SAM multipliers are based on fixed-prices, the simulation results give only a partial, demand-driven, picture of the policy change. Overall, the IM model compares favorably to the SAM approach.

No model of the size and scope of the current LIFT model could have been undertaken by a single person, and its development is

due to the cumulative effort of a number of economists over the past twenty-five years. Just as one small stream gains strength when it reaches a river comprised of water from numerous streams, this dissertation contributes to a twenty-five year flow of econometric work. The work on improving and extending the LIFT model, in particular, and IM modeling in general, will continue, and it is hoped that the contributions made here will prove useful to future researchers.