

Description of the Global Insight Short-Term US Macroeconomic Model

The Global Insight (GI) short-term US macroeconomic model is a large-scale 10-year (44-quarter) macroeconometric model of the US economy. It is used primarily for commercial forecasting. However, over the years, analysts in The Heritage Foundation's Center for Data Analysis (CDA) have worked with economists at Global Insight to adapt the GI model to do policy analysis. In simulations, CDA analysts use the GI model to evaluate the effects of policy changes on not just disposable income and consumption in the short run but also the economy's long-run potential. They can do so because the Global Insight model imposes the long-run structure of a neo-classical growth model but makes short-run fluctuations in aggregate demand a focus of analysis.

The Global Insight model can be used to forecast over 1400 macroeconomic aggregates. Those aggregates describe final demand, aggregate supply, incomes, industry production, interest rates, and financial flows in the US economy. The Global Insight model includes such a wealth of information about the effects of important changes in the economic and policy environment because it encompasses detailed modeling of consumer spending, residential and non-residential investment, government spending, personal and corporate incomes, federal (and state and local) tax revenues, trade flows, financial markets, inflation, and potential gross domestic product (GDP).

Consistent with the rational expectations hypothesis, economic decision making in the Global Insight model is generally forward looking. However, in some cases, Global Insight assumes that expectations are largely a function of past experience and recent changes in the economy. Such a retroactive approach is taken in the model because GI believes that expectations change little in advance of actual changes in the economic and policy variables about which economic decision makers form expectations.

An Econometric Dynamic Equilibrium Growth Model.¹ The Global Insight model incorporates the best insights of many theoretical approaches to the business cycle: Keynesian, New Keynesian, Neoclassical, Monetarist and Supply-side. In addition, the Global Insight Model embodies the major properties of the neo-classical growth models developed by Robert Solow. This structure guarantees that short-run cyclical developments converge to robust long-run equilibrium.

In growth models, the expansion rate of technical progress, the labor force, and the capital stock determine the productive potential of an economy. Both technical progress and the capital stock are governed by investment, which in turn must be in balance with post-tax capital costs, available savings, and the capacity requirements of current spending. As a result, monetary and fiscal policies influence both the short- and the long-term characteristics of such an economy through their impacts on national saving and investment.

¹ Ken Beauchemin, the Director of Global Insight's US Macroeconomic Group, provided the more detailed description of the Global Insight model that follows.

A modern model of output, prices, and financial conditions is melded with the growth model to present the detailed, short-run dynamics of the economy. In specific goods markets, the interactions of a set of supply and demand relations jointly determine spending, production, and price levels. Typically, the level of real (inflation-adjusted) demand is driven by prices, income, wealth, expectations, and financial conditions. The capacity to supply goods and services is keyed to a production function combining the basic inputs of labor hours, energy usage, and the capital stocks of business equipment and structures, and government infrastructure. The “total factor productivity” of this composite of tangible inputs is driven by expenditures on research and development that produce technological progress.

Prices adjust in response to gaps between current production and supply potential and to changes in the cost of inputs. Wages adjust to labor supply-demand gaps (indicated by a demographically-adjusted unemployment rate), current and expected inflation (with a unit long-run elasticity), productivity, tax rates, and minimum wage legislation. The supply of labor positively responds to the perceived availability of jobs, to the after-tax wage level, and to the growth and age-sex mix of the population. Demand for labor is keyed to the level of output in the economy and the productivity of labor, capital, and energy. Because the capital stock is largely fixed in the short run, a higher level of output requires more employment and energy inputs. Such increases are not necessarily equal to the percentage increase in output because of the improved efficiencies typically achieved during an upturn. Tempering the whole process of wage and price determination is the exchange rate; a rise signals prospective losses of jobs and markets unless costs and prices are reduced.

For financial markets, the model predicts exchange rates, interest rates, stock prices, loans, and investments interactively with the preceding GDP and inflation variables. The Federal Reserve sets the supply of reserves in the banking system and the fractional reserve requirements for deposits. Private sector demands to hold deposits are driven by national income, expected inflation, and by the deposit interest yield relative to the yields offered on alternative investments. Banks and other thrift institutions, in turn, set deposit yields based on the market yields of their investment opportunities with comparable maturities and on the intensity of their need to expand reserves to meet legal requirements. In other words, the contrast between the supply and demand for reserves sets the critical short-term interest rate for inter-bank transactions, the federal funds rate. Other interest rates are keyed to this rate, plus expected inflation, Treasury borrowing requirements, and sectoral credit demand intensities.

The old tradition in macroeconomic model simulations of exogenous fiscal or environmental policy changes was to hold the Federal Reserve’s supply of reserves constant at baseline levels. This approach makes static analysis easier in the classroom. However, it sometimes creates unrealistic policy analyses in dynamic models. In the Global Insight model, “monetary policy” is defined by a set of targets, instruments, and regular behavioral linkages between targets and instruments. The model user can choose to define unchanged monetary policy as unchanged reserves, or as an unchanged reaction

function in which interest rates or reserves are changed in response to changes in such policy concerns as the price level and the unemployment rate.

Monetarist Aspects. The model carefully represents the diverse portfolio aspects of money demand. It also captures the central bank's role in long-term inflation phenomena.

The private sector may demand money balances as one portfolio choice among transactions media (currency, checkable deposits), investment media (bonds, stocks, short-term securities), and durable assets (homes, cars, equipment, structures). Given this range of choice, each medium's implicit and explicit yield must therefore match expected inflation, offset perceived risk, and respond to the scarcity of real savings. Money balances provide benefits by facilitating spending transactions and can be expected to rise nearly proportionately with transactions requirements unless the yield of an alternative asset changes.

Now that even demand deposit yields can float to a limited extent in response to changes in Treasury bill rates, money demand no longer shifts quite as sharply when market rates change. Nevertheless, the velocity of circulation (the ratio of nominal spending to money demand) is still far from stable during a cycle of monetary expansion or contraction. The simple monetarist link from money growth to price inflation or nominal spending is therefore considered invalid as a rigid short-run proposition.

Equally important, as long-run growth models demonstrate, induced changes in capital formation can also invalidate a naive long-run identity between monetary growth and price increases. Greater demand for physical capital investment can enhance the economy's supply potential in the event of more rapid money creation or new fiscal policies. If simultaneous, countervailing influences deny an expansion of the economy's real potential, the model *will* translate all money growth into a proportionate increase in prices rather than in physical output.

Rational Expectations. As the rational expectations school has pointed out, much of economic decision-making is forward looking. For example, the decision to buy a car or a home is not only a question of current affordability but also one of timing. The delay of a purchase until interest rates or prices decline has become particularly common since the mid-1970s when both inflation and interest rates were very high and volatile. Consumer sentiment surveys, such as those conducted by the University of Michigan Survey Research Center, clearly confirm this speculative element in spending behavior.

However, households can be shown to base their expectations, to a large extent, on their past experiences. They believe that the best guide to the future is an extrapolation of recent economic conditions and the changes in those conditions. Consumer sentiment about whether this is a "good time to buy" can therefore be successfully modeled as a function of recent levels and changes in employment, interest rates, inflation, and inflation expectations. Similarly, inflation expectations (influencing financial conditions) and market strength expectations (influencing inventory and capital spending decisions) can be modeled as functions of recent rates of increase in prices and spending.

This largely retrospective approach is not, of course, wholly satisfactory to pure adherents to the rational expectations doctrine. In particular, this group argues that the announcement of macroeconomic policy changes would significantly influence expectations of inflation or growth prior to any realized change in prices or spending. If an increase in government expenditures is announced, the argument goes, expectations of higher taxes to finance the spending might lead to lower consumer or business spending in spite of temporarily higher incomes from the initial government spending stimulus. A rational expectations theorist would thus argue that multiplier effects will tend to be smaller and more short-lived than a mainstream economist would expect.

These propositions are subject to empirical evaluation. Our conclusions are that expectations do play a significant role in private sector spending and investment decisions. But there is very little room for significant changes in expectations in advance of the actual change in the variable about which the expectation is formed. Thus, the rational expectations school correctly emphasizes a previously understated element of decision-making, but exaggerates its significance for economic policy-making and model building.

Theory As a Constraint. The conceptual basis of each equation in the Global Insight Model was thoroughly worked out before the regression analysis was initiated. The list of explanatory variables includes a carefully selected set of demographic and financial inputs. Each estimated coefficient was then thoroughly tested to be certain that it meets the tests of modern theory and business practice. This attention to equation specification and coefficient results has eliminated the “short circuits” that can occur in evaluating a derivative risk or an alternative policy scenario. Because each equation will stand up to a thorough inspection, the Global Insight Model is a reliable analytical tool and can be used without excessive iterations. The model is not a black box—it functions like a personal computer spreadsheet in which each interactive cell has a carefully computed, theoretically-consistent entry and thus performs logical computations simultaneously.