12.5 Determinants of Investment

The main catalyst for, and component of, business cycles fluctuations in output is changes in investment. It is a complex function of many variables. These are listed below, their interconnections are analyzed, and then expressed as an equation. To begin with, we should distinguish between business (or investment) climate versus business (or investor) conditions and sentiment. The former is long term and rooted in 'microeconomic' factors, while the latter is short term and based on macroeconomic factors. Business Climate is discussed in detail in the next Chapter 5 on Building the Framework for a Growing Economy (Section on Ease of Doing Business of EGI).

Business Climate is linked to laws and changes very slowly. We can think of it as a background factor and take it as given and hence ignore it for short run analysis. By contrast for the short-term (quarterly data) and medium term (business cycles durations) Business Conditions and Sentiment is what counts. The distinction is not water-tight but is useful for short run macroeconomic analysis.

(1) Business Conditions and Sentiment: Broad expectations regarding the Government policy, elections, the budget, plus above all intangible sentiment - what Keynes called 'animal spirits' which cannot be linked to any specific variable and is generally believed to be irrational.

In a very often cited passage from the General Theory, Keynes stated:

"Most probably, of our decisions to do something positive, the full consequences of which will be drawn out over many days to come, can only be taken as a result of animal spirits – of a spontaneous urge to action rather than inaction, and not as the outcome of a weighted average of quantitative benefits multiplied by quantitative probabilities. Enterprise only pretends itself to be mainly actuated by the statements in its own prospectus…Thus if the animal spirits are dimmed and the spontaneous optimism falters, leaving us to depend on nothing but a mathematical expectation, enterprise will fade and die…. This means, unfortunately, not only that slumps and depressions are exaggerated in degree, but that economic prosperity is excessively dependent on a social and political atmosphere which is conducive to the average business man"…But later on he states, "We should not conclude from this that everything depends on waves of irrational psychology…"(1936, p. 162)

Much of the conflict between the new field of behavioural finance and orthodox finance boils down to whether business investment decisions are determined by Net Present Value or animal spirits. Or

more realistically, the relative importance of these two. After the collapse of the world economy in late 2008, the emphasis on animal spirit as driving investment has gone up considerable, with a well-known book titled 'Irrational Exuberance (2000)' written on this.

This above passage relates to the ongoing debate between textbook finance theory based on present values and the more recent field of behavioural finance that stresses psychology. For instance, during the dotcom boom towards its end was driven mainly by a reckless investment boom. Cisco (and other IT firms) although overstaffed, kept on hiring and laid enormous optic fibre cables under the ocean for long distance calls without proper calculation of demand. India's call centres and BPOs have been the unexpected beneficiary of this mistake. (See "Principles of the Master Cyclist" a case study of different management strategies of Johnson & Johnson vs Cisco by Peter Navarro, Chapter 1)

Nowadays various surveys of firms and other entities capture and quantify the business sentiment (NCAER for India, Tankan in Japan etc.), both current and expectations, one quarter or more ahead. The RBI survey on assessment and expectations of business conditions is attached (at end Page # 23).

(2) <u>Capacity Utilization rate</u>: Like holding costly inventories, firms keep a buffer of capacity to meet sudden increase in demand. At any point, the higher the capacity utilization rate, the higher the amount of extra equipment the firm will build or purchase. After Cisco collapsed in April 2001, investment was down in USA for seven quarters in a row.

(3) <u>Sales Expectations (S exp)/Accelerator Effect</u>: Investment is also linked to say change in past sales or output. The accelerator effect is linked to replacement for depreciating machines:

$$I_t = \beta(S_t^{exp} - S_{t-1}) \quad \text{or} \quad I_t = \beta(Y_t - Y_{t-1})$$

(4) <u>Profits/Retained Earnings</u>: If firms could borrow unlimited amounts, then profits or earning would not matter. But they cannot, and so the payout ratio or 'gearing' ratio affects investment. Firms with more retained earnings are able to invest more in plant and equipment. (Fazzari, Hubbard, Petersen).

(5) <u>Stock Prices</u>: When stock prices are high (as measured by Tobin's q-ratio- the ratio of market to book value), then firms find it cheap to issue shares to finance investment.

(6) <u>Technology/Micro Factors</u>: The real business cycle view is that investment is mainly driven by changes in technology, discussed in 1.5.1 in EGI. Interest rates and macro factors matter much less.

(7) <u>Interest Rates</u>: Their effect on investment is through various channels.

(8) <u>Credit Rationing</u>: The granting of loans and credit also determine investment.

Overall we need to think of the determinants of investment in a multi factor way, and that these factors can and do feed upon each other in a mutually reinforcing way. Statistically they are collinear and it is necessary to separate out the different influences.

Thus we can formulate what is called an investment function as follows:

$I_t = I$ bar $+ \alpha_2$ Capacity Utilization Rate $+ \alpha_3 \Delta Y_{t-1} + \alpha_4$ Payout Ratio $+ \alpha_5 q - \beta$ IntRate

$\qquad\qquad >0 \qquad\qquad\qquad\qquad\qquad >0 \qquad <0 \qquad\qquad >0 \qquad >0$

Which can be summarized as:

$$I = I \text{ bar} + \alpha \text{ (Business Cycle or Income Effect)} - \beta \text{ (Interest Rate)}$$

Here the term I Bar combines all autonomous factors (Business Climate, Technological factors, Business Conditions and Sentiment). The composite term α <u>aggregates</u> the impact of all the factors (capacity utilization, accelerator, payout ratio etc discussed above) that are <u>procylical,</u> and linked to rising GDP growth or change in income (as in the accelerator effect) during the cycle. While the above is a realistic and sufficiently detailed investment function, it is complicated to analyze in a simple model because of the lag effects and interaction between income/GDP and investment, which requires difference equations.

The more common function is (and easy to work with) is: $I = I$ bar $- \beta$ (Interest Rate)

Implicitly the business cycle terms are all incorporated in the term I bar. While Sentiment is strongly and positively linked to Income, suddenly it can change, due to say a financial panic, triggering a drop in investment and GDP. It can, in turn, be influenced by a weak economy.

Analyzing the Connection between Interest Rate and Investment

A crucial fact is that we often see that the interest rate R has risen and investment has also gone up and conclude that R does not influence investment. This is not the case. Other factors would have moved Investment in the opposite direction. What economic theory says is that other things being equal, I will fall as R goes up, i.e., $\frac{\delta I}{\delta R} < 0$. Part of the economic way of thinking is to draw conclusions by controlling for different effects and assessing their relative importance.

An example from microeconomics may help clarify this point. Other things equal, a rise in medical costs and prices will reduce the demand for say, surgeries, and so there should fewer surgeries. As the price goes up, along the demand curve, the quantity demanded goes down. But over years we see medical costs and the health care price index going up sharply, and yet more people are having surgeries. This is because of the income effect. As income rises, the demand curve shifts to the right (medical expenses have a high income elasticity of demand) and so more surgeries are performed.

The same logic applies with respect to impact of interest rate on investment. Ceteris paribus, higher R lowers investment. But in time series data, the business cycle effect dominate and so higher rates are associated with higher investment, which is quite procyclical Periods of high growth and thus high income also tend to be those with high interest rates and high investment and vice versa. A good way to understand the above discussion of the determinants of investment is to look at data for USA from 1990 through the dotcom boom and beyond the financial crisis of 2008. (We can do this for the earlier period 1950 to 1990 also.)

Chart: Links Between Interest Rate and Investment Component of GDP for USA