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# The Conditions for Sustainable U.S. Recovery: The Role of Investment

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## INTRODUCTION

Real gross private domestic investment in fixed capital (both residential and non-residential, which includes plant, equipment and inventories) is the most volatile component of aggregate demand that can invariably lead the economy into recession or recovery. It is, in fact, "the pace and pattern of business investment in fixed capital" that "are central to our understanding of economic activity" (Chirinko, 1993, p. 1875). The question we wish to address in this paper is the extent to which current behavior of investment will lead to sustained economic recovery. There are two views of the investment outlook for the immediate future. In the rosy scenario, which is shared by policymakers, a number of economists and financial markets (see, for example, OECD, 2002; Alan Greenspan's Testimony to Congress, 2002), investment will pick up, since after a soft fourth quarter of 2002, the economy will resume its path to recovery in the first half of 2003. The latest rate cut by the Fed (November, 2002), as well as the planned tax reductions, will give a boost to investment. The hypothesis is that tax cuts will boost consumption, and given the lean inventories of the corporate sector, industrial production will increase and with it capacity utilization. Given a boost in demand, increased depreciation allowances will boost profits and hence investment will pick up, thereby making the recovery sustainable. This scenario is based on how economic policy might influence the short run factors that affect investment, which, however, do not look good at the moment. The second scenario, proposed in this study, emphasizes the long-run nature of the relevant factors, and suggests that for investment to pick up not only should the short-run factors improve, but also the imbalances of the corporate sector should be corrected.

Building on previous work (Arestis and Karakitsos, 2002), we wish to argue in this paper that although both views deserve some attention, unless the imbalances in the corporate sector are

corrected, investment will not improve. We proceed by looking at the recent behavior of the variable in hand. We then turn to the short-term and long-term factors that can affect investment behavior. This enables us to propose a formal set of relationships which are estimated for the period 1949-2002. The paper then undertakes a number of simulation exercises in an attempt to examine the likely impact on investment when the short-run and the long-run factors are put together. A final section summarizes and concludes.

## RECENT BEHAVIOR OF INVESTMENT

In the current downturn investment fell 11% in the three quarters leading up to the trough compared with 15% average fall in the last ten recessions (see Table 1).<sup>1</sup> Investment peaked in the second quarter of 2000, doubly bottomed in the fourth of quarter of 2001, recovered strongly in the first quarter of 2002, but lost steam since then (see Figure 1). To a large extent the recovery in investment reflects the end of de-stocking and increased depreciation investment on equipment and software (as the cycle of computers is two to three years and there was a rush of buying just before 2000). Investment on structures has continued to decline, while residential investment has stalled. Any lingering fears of a double-dip recession are caused from the hitherto poor performance of investment. But are such fears justified? How has investment responded in previous business cycles?

Figures 2 and 3 show the behavior of investment for eight quarters before and after the trough of the recession, as percent of the earlier year and as percent of GDP. To simplify comparisons only four lines are shown, the average of the five demand-led recessions in 1947-72, the average of the three supply-led business cycles in 1973-84, the early 1990s recession and the current one. In all cyclical downturns investment bottoms either at the trough of the business cycle or with one quarter lag. Hence, investment is either a coincident or lagging indicator of the trough of the business cycle. The fall in investment in the current downturn is the steepest of all recessions, -3.4% of GDP. In the average demand-led cycle, investment fell by 2 % of GDP, while in the average supply-led cycle it fell by 2.8% and in the 1991 downturn it fell by 2.4%. In the recovery of 1991 investment grew at the smallest pace of all ten business cycles, dubbing the recovery anaemic. In the first year of the recovery investment grew by 0.3% of GDP, compared with 1.8% of GDP in the average demand- and supply-led cycle. By the end of the second year of the recovery, investment had grown by 1.7% of GDP in the early 1990s downturn, compared with 2.4% and 2.1% of GDP in the average demand- and supply-led cycle, respectively, thereby largely catching up with previous business cycles. In the first year of the current downturn, investment grew by 0.7% of GDP. Hence, the current recovery is also anaemic because of balance sheet problems (or imbalances) not only in the business sector, as was the case in 1991, but in the personal sector, too.

There are two views in the market regarding investment. In the first view (the rosy scenario) investment will pick up in the first half of 2003 making the recovery sustainable. Easy monetary and fiscal policy, in particular the new boost through tax cuts of the order of 3% of GDP that the Bush Administration has proposed to implement, will make sure that investment does indeed pick up. The rosy scenario reflects the consensus view, as epitomized in economic forecasts, policymakers' views (Greenspan Testimonies, for example July, 2002; Bank of England Inflation Report, European Central Bank, Monthly Bulletin, both in terms of their issues since August, 2002), the yield curve and interest rate futures.<sup>2</sup>

In the pessimistic scenario, which is the minority view, including the argument advanced in this paper, the poor investment performance is due to corporate sector imbalances, associated with the burst of the "new economy" bubble that will take time to be corrected. In what follows we examine the extent to which the predictions of the two views might explain the behavior of investment (see, also, Godley and Izurieta, 2002).

## **SHORT-RUN FACTORS AFFECTING INVESTMENT**

For the recovery to become sustainable investment must turn around, which, in turn, implies that profitability must start to recover first and capacity utilization must also bottom. Figure 4 shows that capacity utilization after one year of recovery is just at the same level as in the bottom of the recession. This implies that too much capacity was installed in the euphoria years of the bubble in the second half of the 1990s and that even with resilient consumption so far capacity utilization has not recovered, as demand has turned out to be lower than anticipated. This is compatible with the fear that if the economy were to stumble and consumer confidence was lost, then investment would not merely recover, but it would also plunge once more.

Figure 5a shows the non-farm, non-financial corporate profit per unit of output on a Year-on-Year basis. It is clearly a coincident or leading indicator of the trough of the business cycle. In the demand-led business cycles the unit profit bottomed at the trough of the business cycles. In the supply-led business cycles the unit profit bottomed one quarter earlier than the trough. However, in both cases the rebound in unit profit was very buoyant in the first year of the recovery, although it declined in the second year. In the early 1990s recession unit profit did not recover for a long time. It had a double bottom and it remained in negative growth even after two quarters from the trough of the recession. Throughout the recovery phase it even remained at the worst subdued rate in the post World War II era. In the current downturn unit profit fell very sharply in the downswing, yet it bottomed three quarters before the trough and recovered but only for two quarters after the trough. It has now peaked and its growth rate has been halved. This is bad news for future profitability as total corporate profits have been boosted in the last quarter by increased volume of sales, which is unsustainable as it was triggered by zero finance.

The corporate sector pre-tax profits as a percent of GDP have deteriorated in every downswing, although they have bottomed at the trough of the business cycle. In the demand-led business cycles corporate profits bottomed at 6.6% of GDP, whereas in the supply-led business cycles they bottomed at 5.4%, (see Figure 5b). In the early 1990s recession profits deteriorated even more. They bottomed at only 3.7% of GDP. In the current recession they bottomed at 2.3% of GDP. The dramatic improvement in profitability in the second half of the 1990s did not prove to be sustainable. All gains were lost in the last year leading to the trough. Thus, the popular perception of a revival in corporate profitability in the second half of the 1990s simply proved to be a mirage based on creative accounting.

For corporate profitability to turn around unit labor cost must peak and begin to decline, as it accounts for more than two-thirds of total cost. Figure 6 shows that the year-on-year rate of growth of unit labor cost is a leading indicator of the trough of the business cycle by one to four quarters. In the current downturn unit labour cost peaked three quarters before the trough. However, unit labor

cost bottomed two quarters after the trough, instead of four in the demand- and supply-led business cycles. This is bad news for future profitability. The long-term outlook for corporate profits looks increasingly bleak, as costs (both labor and non-labor) are on the increase and the one-off factors that contributed to an improvement in profits following 11 September are fading away. A new round of layoffs and hence a double dip recession may be necessary if profits are to recover, unless demand picks up, which seems unlikely.

The other factor that restrains earnings and must be corrected for the recovery to take place is that companies must first liquidate their inventories of unsold goods. Thus, the inventory to sales ratio in manufacturing is a leading indicator of the trough of the business cycle by one or two months (see Figure 7). In the worst case it is a coincident indicator. In the current downturn it already peaked four months before the trough and has not yet bottomed. This provides the strongest evidence that there are no excess inventories to cause a double-dip recession.

After excess inventories are sold, production should be resumed. Hence, industrial production is a lagging indicator of the trough of the business cycle by one or two months (see Figure 8). In the 1991 recession it bottomed with one-month lag and at a higher rate than the average demand- or supply-led business cycle. However, it grew at the smallest possible rate during the recovery, thus underlining the nature of the anaemic recovery. In the current downturn it bottomed two months after the trough, but it has grown very slowly thereby again showing that the first year of the recovery has been anaemic. Even worse, industrial production peaked thus suggesting that a double-dip recession may have already started in manufacturing.

Overall, the short run analysis suggests that investment has bottomed, but its recovery has so far been anaemic. This may not be so bad, as in the early 1990s, the only other incident of an anaemic recovery, investment picked up steam in the second year of the recovery. Widely held hopes that the recovery will become sustainable next year are based on the pattern of investment in the 1990s downturn. Moreover, on the positive side, inventories have been liquidated, thus paving the way for an increase in production, if demand were to remain resilient. Unfortunately, industrial production has declined since last August and, if sustained over the next few months, then investment would definitely take another plunge. Moreover, capacity utilization continues to linger at levels experienced at the bottom of the recession. The prospects of corporate profits are also poor.

## **LONG-RUN FACTORS AFFECTING INVESTMENT: CORPORATE SECTOR IMBALANCES**

The anaemic recovery of corporate profitability in the early 1990s downturn was due to the poor financial health of the corporate sector (see, also, Godley and Izurieta, 2002). The net worth of the corporate sector, measured as assets less liabilities at current prices, deteriorated even during the recovery phase of the 1991 downturn, whereas it improved around the trough in the demand- and supply-led business cycles and fluctuated within a small range throughout the cyclical downturn (see Figure 9). Moreover, throughout the early 1990s downturn (two years before and after the trough) the net worth of the corporate sector was on a downtrend. This is due to the high debt gearing, characteristic of modern corporate finance. In every business cycle debt levels have increased.<sup>3</sup> In the demand-led business cycles debt as percent of GDP peaked at the trough at 28% (see Figure 10). In the supply-led business cycles it increased to 33% of GDP at the trough, but in

the 1991 recession it soared to 43%.

The high debt levels require not only more expensive servicing, as interest rates are usually high during the downswing phase of the business cycle, but also large volumes of new issues to replenish maturing debt. In the downswing phase access to capital markets and the terms of issuing new debt deteriorate. Companies are, therefore, forced to cut drastically on new credit poised to finance investment and are restricting themselves to refinancing existing obligations, even at worse terms. This makes the recovery anaemic, as companies attempt to pay back debts and refrain from spending on new investment. This is exactly what happened in the recovery of the 1991 recession. Thus, although the 1991 downturn was demand-led, it differed substantially from the previous recessions of 1947-72 because the corporate sector was involved in the long process of curbing its high debt levels and restoring a healthy balance sheet. In the two years following the trough of the 1991 downturn companies reduced their debt by more than 4% of GDP and 5% from the peak of debt one quarter earlier. In the average demand-led cycle debt peaked at the trough and fell by only 1% of GDP in the first year following the trough. By the end of the second year from the trough, debt was again on the increase, although slightly, as the recovery in profitability induced firms to borrow again to finance business expansion. In the average supply-led cycle debt was cut by 1% in the first year following the trough, but it was restored to the trough level by the end of the second year, as corporate profits recovered and investment picked up.

Unfortunately, in the current downturn the situation is by far worse than even in the early 1990s. Debt levels have continued to rise throughout the recovery and they stand at 48% of GDP. Companies would have to reduce their debt and curtail any plans for new investment in an effort to restore health in their balance sheet. The rate of growth of corporate debt peaks between one or two years before the trough, as companies cut back on new investment (see Figure 11). In the average demand- and supply-led business cycle the rate of growth of debt bottomed two quarters after the trough, but at a positive rate. Hence, debt never stopped growing. Its rate of growth simply slowed. In contrast, in the early 1990s downturn the growth of debt bottomed in three rather than two quarters, but at negative rate, too. So, for the first time firms reduced debt levels to restore financial health in their balance sheet. Debt began to increase again nearly two years after the trough, thereby providing another cause of the anaemic recovery. In the current downturn demand for credit has been reduced from 11.6% at the peak to 1.8% in the third quarter of this year, which is still positive. Hence, debt has not yet stopped growing; its rate of growth has simply been cut drastically.

The ways the debt level affects other company decisions can be judged by examining the degree of debt leverage, measured by the stock of debt as percent of internal funds. The latter is defined as after-tax corporate profits, less dividends plus depreciation (net cash flow). Figure 12 shows this measure of debt leverage. Although companies are usually cutting on debt growth in the downswing of the cycle, internal funds decline even faster and debt leverage is increasing. In the recovery internal funds improve faster and debt leverage is decreasing. In the average demand-led cycle debt leverage increased 87% in the downswing and was reduced 80% in the recovery. In the average supply-led cycle debt leverage increased 37% in the downswing and was cut 27% in the recovery. In the 1991 downturn debt leverage increased 88% in the downswing and fell 71% in the recovery. In the current downturn debt leverage soared 173% in the downswing, but it peaked two quarters before the trough and, after a year in the recovery, it now stands at 654% of internal funds, only 54% above the level that it started. This means that deleveraging has progressed very well.

Unfortunately, the deleveraging process may be stalled as the improvement in profits may come to an abrupt end. If this were to happen, then companies would have to retrench on investment in order to carry on with deleveraging and curtail their debt. The extent of the retrenchment depends on the ease of refinancing the stock of debt and the burden of servicing it on profits and net cash flow.

The ability to refinance debt depends on its composition. The more companies rely on long term debt as opposed to short-term, the easier it becomes to sustain a high level of debt in a cyclical downturn, other things being equal. Figure 13 shows the long-term debt relative to the total. Long-term debt is defined as corporate bonds, municipal securities, which are issued by the local authorities to provide finance to local businesses, and mortgages. Short-term debt is defined as commercial paper, bank loans and other loans and advances, mainly from finance companies. In the average demand- and supply-led business cycle the ability of firms to switch from short to long-term debt was limited. It only started one or two quarters before the trough and was maintained for one year into the recovery. In the average demand-led cycle the switch to long-term debt was only 1.7% of the total. In the average supply led cycle the switch was only 1% of the total. In contrast, in the 1991 downturn companies found it easier to switch into long-term debt by over 5%. Thus, despite the fact that the level of debt was much higher in the 1991 downturn than in previous recessions, companies found it easier to switch into long-term debt. In the current downturn companies have started switching into long-term debt much earlier than ever before--five quarters compared to one or two. Moreover, they have already switched more than 8% of total debt. But whether such switch is beneficial to the net cash flow depends on the relative cost of finance between capital markets and banks.

Figure 14 shows the spread between Moody's AAA bond yield and the bank prime-lending rate. In the average demand-led cycle this spread was almost zero in the downswing and around 50 basis points in the recovery. So, the switch from short to long-term debt was not very important. In the average supply-led cycle the switch into long-term debt would have been beneficial to the net cash flow, as it would have been much cheaper to borrow from the capital markets than from the banks. However, high-grade companies were unable to do so. In the 1991 downturn high-grade companies switched much more than ever before into long-term debt. In the downswing it was beneficial, as it was cheaper to borrow from the capital markets than the banks, but the benefit was lost in the recovery, as the relative cost of borrowing was reversed. This adversely affected the net cash flow of the high-grade companies in the recovery phase and provides another cause for the anaemic recovery. In the current downturn the switch into long-term debt has been even more pronounced and took place much earlier. However, the benefit has also disappeared sooner. In the first year of the recovery it has been more expensive for high-grade companies to borrow from the capital markets than the banks. Hence, the switch into long-term debt has already become a hindrance to the recovery.

For low-grade companies the situation was even worse. Figure 15 shows the spread between Moody's Baa bond yield and the bank prime-lending rate. Very soon in the 1991 cycle it became more expensive than ever before to borrow from capital markets than from the banks. This was another reason for the anaemic recovery. In the current downturn the situation is by far worse. The large switch into long-term debt has been misconceived, as the rate spread has increased by 4.75% making borrowing from capital markets totally unattractive.

So, in the current downturn companies are more indebted than ever before, but they have managed to switch from short- into long-term debt. This represents a reversal of a long-term trend. In the early 1950s the dependence on long-term debt was around 70%. In the following thirty years companies reduced their dependence on long-term debt and increased that on short-term debt. By 1985 the ratio of long-term debt to total was reduced to 53%, some 17% less than in the early 1950s. From then onwards companies increased their dependence on long-term debt again and reduced that on short-term. The latest figures show that the proportion of long-term debt to total stands at 68%. Hence, two-thirds have so far reversed the trend. Although the dependence on long-term debt is beneficial in the long run, it can be a drawback in a cyclical downturn, as the cost of borrowing from the banks is reduced, while that on capital markets is increased, especially in the recovery, thereby making the recovery anaemic. This has adversely affected the recovery in the early 1990s and is likely to affect the current one.

However, the extent of the damage from the dependence on long-term debt depends on the burden that the servicing of debt imposes on profits and net cash flow. Figure 16 shows corporate interest payments relative to the net cash flow. Debt service is only 17% of net cash flow and has not deteriorated in the first year of the recovery. This is less than the average supply-led cycle, when debt service peaked at 21% of net cash flow one quarter before the trough. In those days companies were not so much indebted, but interest rates were very high. In the 1991 downturn the combination of high interest rates with high indebtedness made debt service even more difficult, as it reached a peak of more than 26% of net cash flow. However, in the course of the recovery the burden of debt service was reduced drastically to 15% over the following two years. In spite of this drop in the burden of debt service the recovery was anaemic.

Overall, the long-run analysis suggests that in the current downturn, although debt levels are higher than ever before interest rates are lower and debt service has been kept low. The switch into long-term debt has helped in the downswing, but it has become a hindrance in the recovery, as companies do not benefit from the low interest rates that the Federal Reserve System has introduced. Credit risk has soared, but interest rates remain low relative to previous downturns. All these factors have contributed to the anaemic recovery of investment in the first year of the new cycle. For investment to pick up the financial health of the corporate sector should start improving and credit risk should abate. Then the debt service burden would be alleviated, and that would improve profits and net cash flow, thereby paving the way for investment to recover. However, it is unlikely that all these conditions will be met in the short run, as it takes time for these imbalances to be corrected. The process of restoring a healthy balance sheet involves a long painful retrenchment on investment.

## **THEORETICAL AND EMPIRICAL ANALYSIS**

### **Theoretical Underpinnings**

It is clear from the above analysis that to understand and analyze the problem in hand, one needs a model of investment, industrial production and capacity utilization. We may assemble together the relevant variables and group them into two categories, just as our analysis above suggests. This implies four short-run variables: Capacity Utilization (CU), Industrial Production (IP), Corporate Profits (CP), and Real Interest Rate (RPLRFID). It also implies two long-run variables: Debt to Investment ratio (DEBTINV) and Corporate Sector Net Worth to GDP ratio (NWGDP).

We may, thus, have as our fundamental equation:

$$(GI) = GI (CU, IP, CP, RPLRFID, DEBTINV, NWGDP) \quad (1)$$

where GI stands for gross investment.

Clearly, our approach to the determinants of investment begins with the general proposition that a number of variables can affect it. We may distinguish economic activity variables (such as CU, IP and NWGDP), essentially based on the accelerator investment model, interest rate/cost-of-capital variables (such as the RPLRFID)<sup>4</sup> and quantity of finance variables. The distinction between cost-of-finance and quantity-of-finance effects relies heavily on the more realistic assumption of imperfect capital markets. The imperfection of capital markets is explained by resorting to a number of factors, but asymmetric information between lenders and borrowers, which might lead to credit rationing, is the most predominant one (Stiglitz and Weiss, 1982; Bernanke and Gertler, 1989). Financial variables and constraints are explicitly included in investment models through the usage of cash flow variables in the menu of explanatory variables for investment (see, for example, Minsky, 1975; Fazzari, 1993; Fazzari and Peterson, 1993; the ideas behind this formulation, however, are embedded in Keynes, 1936). Full recognition of the importance of financial variables in the determination of investment was neglected for a long time in view of the influence of the Modigliani-Miller theorem that corporation leverage and personal leverage of investors were perfect substitutes. As has just been suggested, it is now recognized that this is no longer the case.

Financial factors as crucial determinants of investment have attracted a great deal of interest. External funds are no longer thought as perfect substitutes for internal funds, in view of the recognition that capital markets are imperfect. Finance matters again and significantly, just as it did in Keynes (1936) work (see, also Mayer, 1994).<sup>5</sup> The quantity-of-finance variables can be internal finance variables (such as CP which can be viewed as a critical variable in terms of internal finance; high CP indicates greater capacity by the corporate sector to generate internal funds) and external finance variables (such as DEBTINV, an external cash/flow component, on the assumption that a high debt environment is less likely to provide a stable financial base necessary for investment to materialise). Internal funds and net worth variables are thought to be particularly significant variables in the study by Hubbard (1998) when reviewing capital-market imperfections and investment. He concludes that "(1) all else being equal, investment is significantly correlated with proxies for changes in net worth or internal funds; and (2) that correlation is most important for firms likely to face information related capital-market imperfections" (p. 193). The importance of the external funds and cash flow variables is central to, and particularly emphasised, in the "new consensus" macroeconomics (see, for example, Bernanke and Blinder, 1988; Bernanke and Gertler, 1989, 1999). It has also been vetted more recently by Greenspan (2002), who argues that "capital investment will be most dependent on the outlook of profits and the resolution of the uncertainties surrounding the business outlook and the geopolitical situation. These considerations at present impose a rather formidable barrier to new investment ..... A more rigorous and broad-based pickup in capital spending will almost surely require further gains in corporate profits and cash flows" (p. 7).

Next, we turn our attention to capacity utilization, and propose that it is mostly affected by



industrial production. A higher volume of industrial production is expected to engineer a higher degree of capacity utilization. This association is thought to be strongly positive. This is due to the role of capital stock, which is thought to be fixed in the short run. This relies on the theory of irreversibility of investment under conditions of uncertainty (see, for example, Dixit and Pindyck (1994). We may, thus, write:

$$(CU) = CU (IP)$$

(2)

We also endogenize industrial production as in (3):

$$(IP) = IP(ISM)$$

(3)

where ISM proxies for existing and expected business conditions. ISM is an index of these conditions and it is based on surveys conducted by the Institute of Supply Managers (ISM). It is clear that (3) is based crucially on Keynes's "animal spirits" hypothesis and the uncertainty that characterises expectation in the work of Keynes (1936). It is, thus, the case that in our modelling strategy ultimately "animal spirits" and uncertainty of expectations critically influence investment, but the relationship works basically through industrial production, a variable that plays a critical role in determining gross investment and capacity utilization. This approach also attempts to account for the suggestion made by Eisner (1974), some time ago, that "Major progress in discerning reliable and stable investment functions will require facing up to and illuminating the fundamental relations between past, present and future" (p. 102).

### **Empirical Evidence**

The estimated relationships are reported in Appendix 2. The data utilized for estimation purposes are quarterly spanning 1949(1Q) to 2002(3Q) for GI and CU. For industrial production data are monthly for the period 1989(1M) to 2002(10M). We may note that the mnemonics in Appendix 2 are the same as above with two exceptions: D before a variable means "change in" that particular variable; and L in front of a variable is the logarithm of that particular variable. Data on corporate sector imbalances were obtained from the Flow of Funds Accounts, Board of Governors of the Federal Reserve System. Data on investment were obtained from NIPA accounts of the Bureau of Economic Analysis. The rest of the data came from Bloomberg.

The estimated relationships are well specified with satisfactory statistics/diagnostics. The model structure is stable in that it is capable of explaining with relatively great precision the behavior of investment in the span of the last fifty years that includes ten business cycles. This is remarkable because five of these cycles are demand-led; three of them are supply-led, while the last two are related to serious imbalances in the corporate sector.

Industrial production and capacity utilization were the main determinants of investment in the demand-led business cycles of 1947-72. But a model that relied on only those factors would have missed the behavior of investment in the supply-led business cycles of 1973-84. Corporate

profitability and real interest rates were in addition needed to explain investment in the supply-led business cycles. But a model that relied on these four factors would have been incapable of explaining investment in the last two business cycles. The long run factors are needed, in addition to the short term ones to explain investment in the last two cycles. This does not imply that some of the variables are needed in some cycles, but not in others. If that were the case then one and the same model (i.e. one structure) would not have been sufficient in explaining investment in all business cycles. Instead, three different models would have been required to explain investment in all ten cycles; the structure would not have been unique. In our model the structure is unique and that implies that the importance of each variable in explaining investment has remained stable in all business cycles. However, the variability of each variable in every cycle has been different. In this sense, the long run factors did not vary significantly to contribute to the explanation of the volatility of investment in the first eight cycles, but they were extremely important in explaining why investment fell to the extent that it did in the last two cycles. Had these variables assumed different values to those that they actually did in any of the last fifty years then the model would have still been able to explain investment.

The forecast error in the model summarized in equations (1) to (3) is only 2%. This means that with an error of 4% the model can explain 95% of all past investment volatility. Indeed, in the last 200 quarters there have been only five instances where the investment error has exceeded 4% (see Figure 17). On that basis the forecasting ability of the model is such as to claim that with 95% probability investment in the future will lie within the interval of the central projection plus or minus 4%. This assumes that the behavior of investment will continue to be governed by the same structure that is encapsulated in the model of this paper. The assurance here rests with the fact that even from a theoretical point of view there are no other cycles except demand, supply and debt deflation, associated with imbalances in the corporate sector. Hence, there is no reason to assume that the structure of the model, summarized in equations (1) to (3), will be invalidated in the short-term future.

Figure 18 shows the predictive ability of our model in forecasting and explaining the rate of change of investment over the previous quarter, which is usually very difficult. A cursory look at this figure shows that the model is passing satisfactorily this difficult test.

Clearly, in forecasting investment two more relationships are in order. One is for predicting industrial production and the other capacity utilization. The forecast error of the industrial production relationship is only 0.6%. Figure 19 shows that there have been only five instances in the last fifty years where the forecast error of industrial production has exceeded 1.2%. The forecast error of the capacity utilization relationship is only 0.4%. Figure 20 shows that there have been only six instances in the last fifty years where the forecast error of capacity utilization has exceeded 0.8%.

## **THE LIKELY IMPACT ON INVESTMENT**

What is the picture that emerges when equations (1) to (3) are put together? As suggested earlier, the rosy scenario relies to a large extent not on the current short-term factors, but on how these would be affected by economic policy. The rosy scenario ignores the long-term factors. Hopes of an investment recovery vary from simple historical observations that, even in an anaemic recovery, it

picks up in the second year, as it happened in the early 1990s, to arguments that a huge tax-reduction package would take care of investment if it were to falter. In particular, the advocates of the rosy scenario pin their hopes on the effect that fiscal incentives on depreciation would have on corporate profits and on the effect that tax cuts would have on consumption. The hypothesis is that consumption will be boosted and, given the lean inventories of the corporate sector, industrial production will pick up, thereby lifting capacity utilization. Given the boost in demand, increased depreciation allowances will bolster profits and hence investment will pick up.

However, there are doubts as to whether all the conditions just enumerated can be met. First, consumers may be hesitant in spending the injection to income from the tax cuts and may instead decide to save it, if they are not confident that their jobs are safe and their income would continue to grow. Second, the improvement in corporate earnings resulting from tax incentives on depreciation is once and for all, and as last year's experience suggests the effect fades away within a year from the date the incentives are introduced. Third, the excess capacity can be eliminated either by scrapping it or by a permanent boost in demand. If there is uncertainty as to the effect of the tax cuts on consumption, companies will wait before investing, until wear and tear erode the excess capacity. But this will take time. Fourth, there is uncertainty of the required size of the fiscal stimulus, as well as to the timing of becoming effective.

In the pessimistic scenario for investment to pick up not only should the short-run factors improve, but also the imbalances of the corporate sector should be corrected. This requires an improvement of net worth, which can only occur if the high level of debt is reduced, the excess capacity is eliminated, and the improvement in profitability as well as the boost of demand is perceived to be permanent rather than transitory. In this case, too, a number of questions may very well be raised as to the occurrence of these requirements. There is, thus, scope for further investigation.

To gain further insight into the likely course of investment over the next two years we have conducted a simulation exercise using the model described in equations (1) to (3). This exercise relies on the investigation of two scenarios:

- (i) *Scenario I* (Double-Dip Recession): What would happen to investment if the economy were to stumble?
- (ii) *Scenario II* (Recovery): What would happen to investment if the economy were to receive a significant boost from fiscal policy?

We begin with Scenario I.

### **SCENARIO I (DOUBLE-DIP RECESSION)**

The essence of *Scenario I* is that in spite of the headline figures that suggest that there is nothing wrong with the economy, the recovery so far has been anaemic and the economy has been performing a balancing act on a tightrope. Consumption has been resilient because of the boost in income from the tax cuts. Consumers have saved most of this extra income, but the two zero finance offers within 2002 have lured them back to shopping. The purpose of the discounts offered by the car and other manufacturers was to get rid of the overhang of unsold inventories. Hence, the

increase in production in the first half of 2002 was due to this liquidation process, which, however, finished in the second quarter of 2002. The round of discounts offered in July 2002, gave a temporary boost to the economy, but its effect faded away very quickly. By September 2002, the rate of growth of consumption had become negative and economic growth in the fourth quarter of 2002 weakened substantially. Industrial production has been falling since last August. Financial markets are already pricing in that the weakness of the fourth quarter of 2002, and this may be carried over to the first quarter of 2003. The increasing threat of war at the time of writing (February, 2003), may undermine both consumer and business confidence and the economy may fall into a double-dip recession in the first quarter of 2003.

In simulating the consequences of *Scenario I*, it is assumed that the double-dip recession will be mild and that industrial production will fall by 2.5% relative to the year earlier period. Table 2 summarizes the values that the main determinants of investment assume in the two scenarios, as well as their latest values. Capacity utilization will fall to 70 from its current value of 75, as the economy falls into recession. Capacity utilization has fallen to such level in four of the last ten recessions. Such a fall, therefore, may seem a lot, given that the recession is assumed to be mild, but it reflects the huge excess capacity that exists as a result of the burst of the "new economy" bubble. Furthermore, total profits will fall by 20% relative to a year earlier, which is very near to the bottom reached in the first quarter of 2001. The real cost of borrowing will remain unchanged at around 5%, as any benefit from lower interest rates will be offset by falling prices of investment goods. Debt as percent of investment will rise to 625% from its current value of 600% (see Figure 21). This represents a small reversal of the progress that has been made so far in reducing debt. Debt as percent of investment peaked at 675% in the fourth quarter of 2001. The net worth of the corporate sector, defined as assets less liabilities, will be further eroded to 75% of GDP from its current level of 83.5%. This compares with the lowest level in the last fifty years of 70% reached in 1993, after a long-term decline in the 1980s that was exaggerated by the retrenchment of the early 1990s recession (see Figure 22).

With these assumptions investment will fall by 10.8% relative to its latest value of \$1596 billion in the first year of the recession, assuming that the recession starts from the first quarter of 2003, and will fall by 15.4% by the end of the second year of the recession (see Table 2).<sup>6</sup> The overall impact of the recession on investment can be captured by the *steady-state multiplier*, which measures this effect, on the assumption that all factors that affect investment have worked themselves out. This measure is useful because it gives the overall impact without making an assumption about the length of the recession or other factors that might come in later on to offset the recession, such as fiscal or monetary policy or any other exogenous factors. The steady-state multiplier is, thus, a pure measure of the overall effect of a double-dip recession of the order of -2.5% in industrial production on investment. The steady-state multiplier is -21%.

The conclusion of this simulation is that investment might collapse if the economy were to stumble and accidentally fall into a double-dip recession. The reason behind this pessimistic conclusion is that the long-run factors that affect investment are clearly unfavorable. The serious imbalances of the corporate sector are ready to be unleashed if an accident were to happen. Moreover, the economy is prone to accidents because the recovery has been anaemic. From this perspective, the latest rate cut by the Fed is, indeed, an insurance policy against such accidents.

## SCENARIO II (RECOVERY)

The essence of this scenario lies on the assumption that the weakness of the fourth quarter of 2002 is transitory and that the economy will rebound either in the first or the second quarter of 2003. The war with Iraq will not have a lasting effect on the economy, and once the threat is removed, either through the eruption of the war or by peace, confidence will be restored and the economy will be back on its path to recovery. From this point of view a big tax-reduction package will help in removing the threat of corporate sector imbalances, thereby ensuring a "feel-good" factor emerging. From this perspective, the sooner the tax-reduction package is implemented the better the chances of ensuring the "feel-good" factor. However, it is interesting to examine the robustness of this assertion. Will such measures help the economy in achieving a sustainable rate of growth beyond November 2004? Is the timing of the implementation of the fiscal stimulus package essential in ensuring that the "feel good" factor is there by November 2004?

In this simulation it is assumed that the fiscal stimulus package is implemented in the first quarter of 2003, and that industrial production recovers to a sustainable path of 2.5% over the previous year. Capacity utilization will climb to 80 (see Figure 20) and total profits will rise to 11% over the previous year. The real interest rate will rise marginally to 5.5% and the debt to investment will fall to 500% from its current value of 600%. The ratio of net worth to GDP will increase to 86%, from its current value of 83.5% (see Table 2).

With these assumptions investment will pick up 10% after a year from the injection of the tax-reduction package. However, in the second year investment will stall (see Figures 17 and 18 for the level of investment and its rate of growth under scenario II). The increase between year 2 and year 1 would only be 0.3%. Even worse, from the second year onwards investment will begin to fall. In the new steady state investment will fall by 3.4% relative to its value in December 2002. The results of this simulation are not good news for the advocates of the rosy scenario. The biggest effect of the tax-reduction package will be felt in the first year and then it will fade away very quickly leaving an overall negative effect. These results confirm survey findings that short-term incentives to invest, such as the much discussed increase in depreciation allowances in 2003, are largely irrelevant to most long- term investment plans.<sup>7</sup>

An interesting conclusion emerges from this simulation. The tax-reduction package will boost investment in the short run, but it will have a negative impact in the long run. Hence, this package will not provide the foundations for a new long lasting business cycle. The recovery will not prove sustainable, unless the imbalances are corrected.

## SENSITIVITY OF SCENARIO II

The plausibility of this scenario depends on how sensitive the projected value of investment is to its determinants. Table 2 provides the results of this sensitivity analysis. For comparison purposes every determinant that is expressed as growth rate (percent over the previous year) has been perturbed by 100% of its value in *Scenario II*. Such perturbation is plausible as it lies well within the historical range. Variables that are expressed as ratios have been perturbed by 10% of their value in *Scenario II*, again a plausible magnitude.

The biggest first year effect comes from capacity utilization. A ten percent improvement in capacity utilization will lift investment by 5.4% in the first year. The second most important factor is debt, as a ten percent reduction in the debt investment ratio will lift investment by 2.7% in the first year. The third most important factor is the corporate sector net worth, as a ten percent improvement in the net worth to GDP ratio will lift investment by 1.9% in the first year. Among the growth rate determinants of investment, industrial production is the most important followed by profits and the real cost of borrowing. The taxonomy of the investment determinants is helpful in appreciating whether a tax-reduction package can lift investment in the first year or not. Any fiscal stimulus will not affect the long run factors of debt, net worth and capacity utilization directly. The effect on profits is small. So, the only way that tax reductions can affect investment is through industrial production. Monetary policy also has a tiny impact on investment, as a doubling of the real interest rate will reduce investment by 0.7% in the first year.

The effect of a permanent boost in industrial production peaks in the second year and then diminishes. In the new steady state investment is raised by 1.9%. The effect of a permanent improvement in all ratios (debt, net worth and capacity utilization) also diminishes through time. The effect of profits, however, is rising through time. In the new steady state a sustained improvement of profitability leads to 2.5% increase in investment. Hence, it is profitability that must improve in the long run if the recovery is to become sustainable. However, this cannot be affected in the long run by fiscal policy.

## **SUMMARY AND CONCLUSIONS**

We have examined two views in terms of the conditions required for sustainable U.S. recovery, and the role of investment in this process. We have put forward a three-equation model of investment determination. To gain further insight into which of the two views is likely to shape investment both in the short and the long run we have simulated the effects on investment within the confines of this model under two assumptions. These are, first, if the economy were to stumble and fall into a double-dip recession, or, second, if the economy moves to recovery through a tax-reduction package. The conclusion of the first simulation is that investment might collapse if the economy were to stumble and fall into a double-dip recession. This is due to serious imbalances in the corporate sector. The effects of these imbalances are ready to be unleashed if a shock were to happen. Moreover, the economy is particularly prone to shocks because the recovery has been anaemic.

The conclusion of the second simulation is that investment could pick up if the economy were to receive a significant tax reduction, but only in the short run. The biggest impact will be felt in the first year, while investment will stall in the second year. In the long run investment will be lower than even before the tax reduction. This signifies the importance of the debt deflation process. Unless the imbalances are corrected tax reductions will be wasted.

The overall conclusion of this paper is that a tax-reduction policy will not provide the foundations for a new long-lasting business cycle. It will merely create a short-run cyclical upturn.

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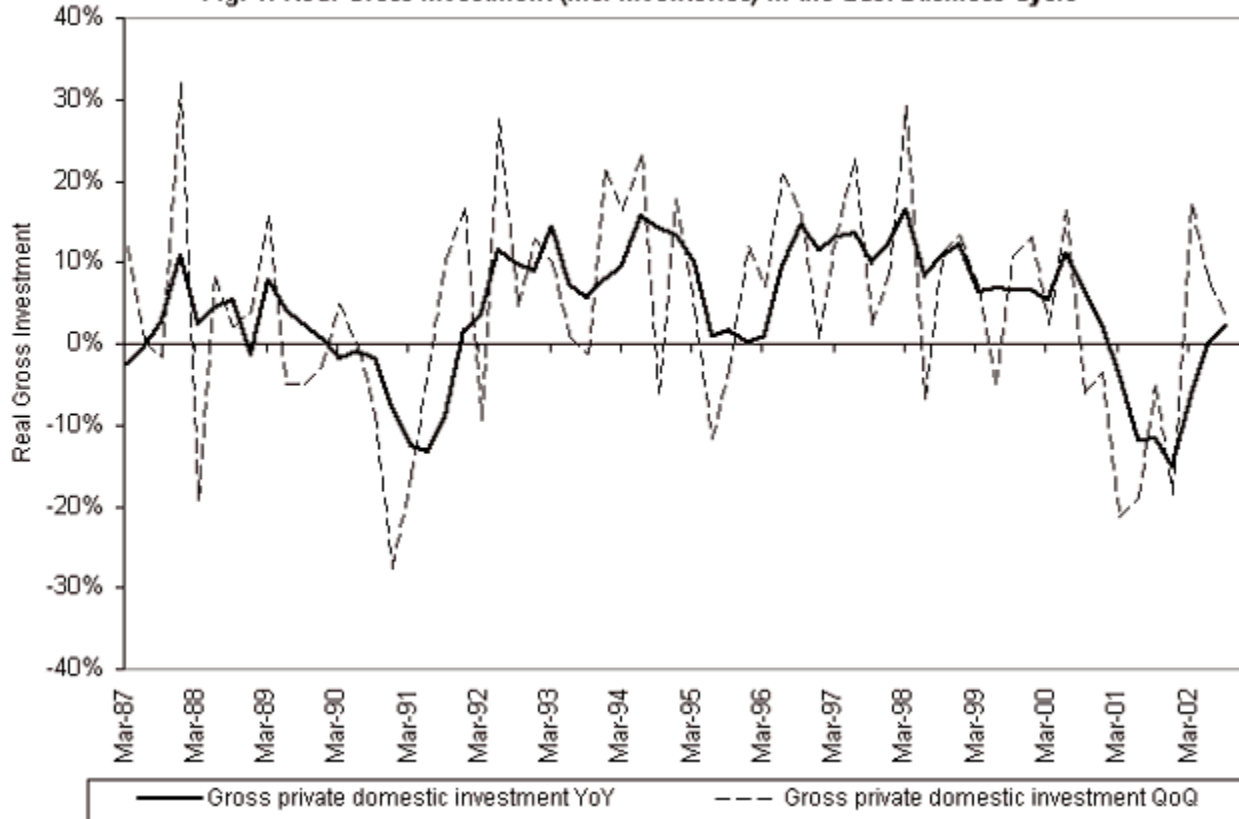
<b>Trough</b>	<b>1949-II</b>	<b>1954-I</b>	<b>1958-I</b>	<b>1960-IV</b>	<b>1970-IV</b>	<b>1975-I</b>	<b>1980-III</b>	<b>1982-III</b>	<b>1991-I</b>	<b>2001-III</b>	<b>Average</b>
GDP	-1.5%	-2.7%	-2.8%	-1.6%	0.0%	-2.9%	-1.9%	-1.7%	-1.5%	-0.6%	-1.7%
Consumption	2.5%	-0.5%	-0.5%	1.0%	1.0%	-0.5%	-1.4%	1.5%	-0.9%	1.3%	0.4%
Gross Domestic Fixed Capital Formation	-30.4%	-11.0%	-13.3%	-21.6%	-3.9%	-21.9%	-16.4%	-12.0%	-12.6%	-11.0%	-15.4%
Exports	7.1%	-3.9%	-15.3%	6.6%	4.6%	-2.6%	4.7%	-7.8%	1.2%	-9.2%	-1.5%
Government Consumption	11.9%	-4.4%	1.5%	3.7%	-0.7%	1.4%	0.5%	1.2%	1.4%	2.5%	1.9%
Job Creation/Losses	-125	-104	-161	-34	-72	-152	-40	-204	-100	-91	-108

		<b>Scenario I</b>	<b>Scenario II</b>	<b>Sensitivity of Scenario II</b>					
<b>Assumptions</b>	<b>Current Values (Base)</b>	<b>Double-Dip Recession</b>	<b>Recovery</b>	<b>Industrial Production</b>	<b>Profits</b>	<b>Capacity Utilization</b>	<b>Debt to Investment</b>	<b>Real Interest Rate</b>	<b>Net Worth to GDP</b>
Industrial Production % YoY	1	-2	2.5	5					
Profits % YoY	12	-20	11		22				
Capacity Utilization	74	70	80			88			
Debt to Investment Ratio	601	625	500				450		
Real Interest rate % p.a.	5.1	5	5.5					11	
Net Worth to GDP Ratio	83.5	75	86						93.5
<b>Effect on Investment</b>									
1-Year Expected Investment \$ billion	1596	1424	1752	1780	1763	1847	1800	1740	1785
% of Base or % of Recovery (1)		-10.8%	9.8%	1.6%	0.6%	5.4%	2.7%	-0.7%	1.9%
2-Year Expected Investment \$ billion		1351	1757	1816	1791	1837	1795	1731	1792
% of Base or % of Recovery (1)		-15.4%	10.1%	3.4%	1.9%	4.6%	2.2%	-1.5%	2.0%
Steady State Investment \$ billion		1261	1542	1571	1580	1590	1562	1499	1556

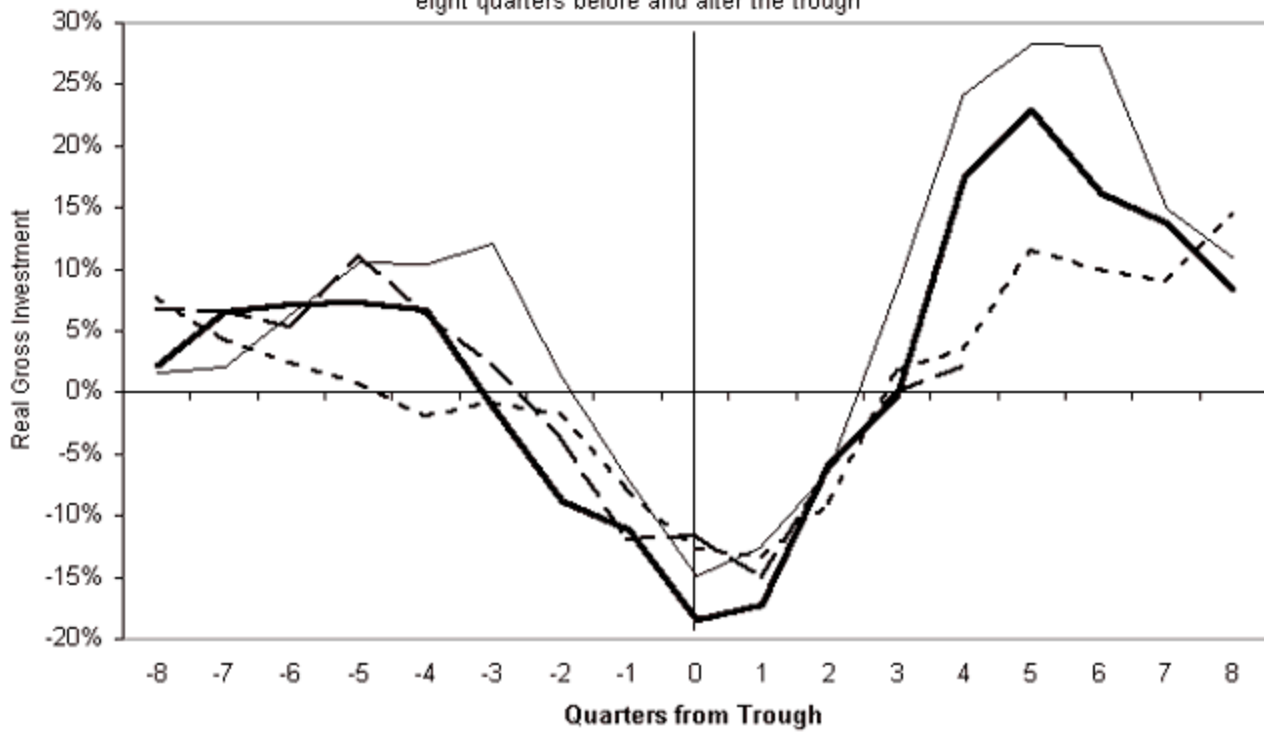
% of Base or % of Recovery (1)		-21.0%	-3.4%	1.9%	2.5%	3.1%	1.3%	-2.8%	0.9%
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(1) For the two scenarios the % change is computed relative to the base value (1596); for the sensitivity analysis the % change is computed relative to the recovery value (1752).

Fig. 1: Real Gross Investment (incl Inventories) in the Last Business Cycle

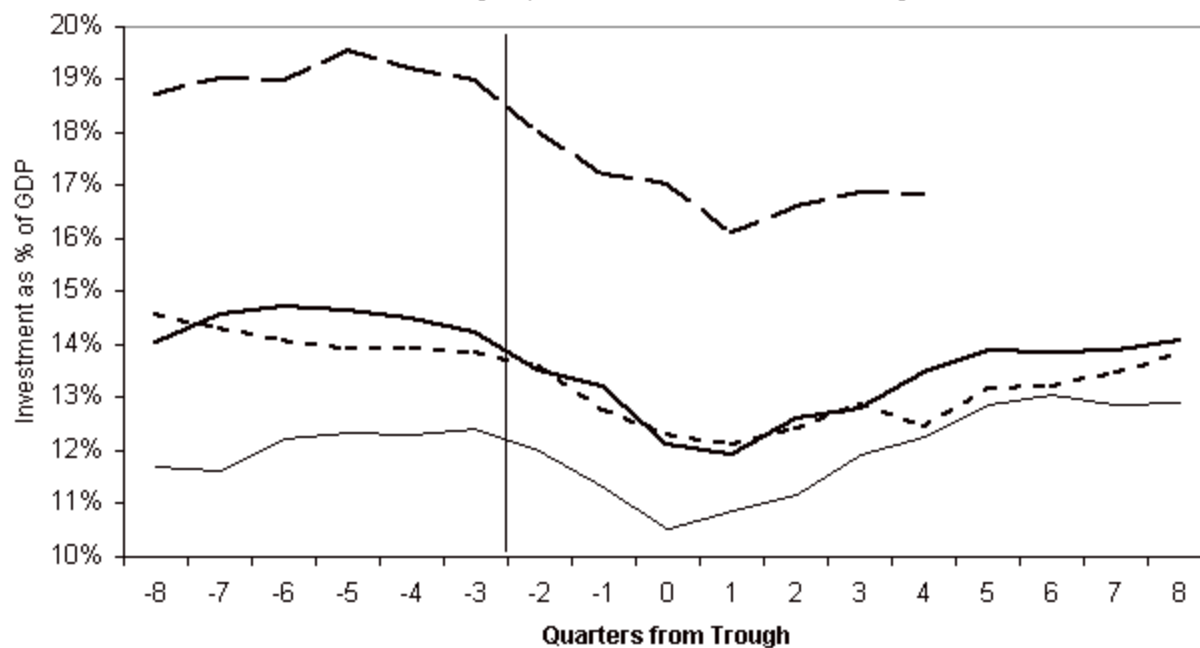


**Figure 2: Real Investment YoY**  
eight quarters before and after the trough



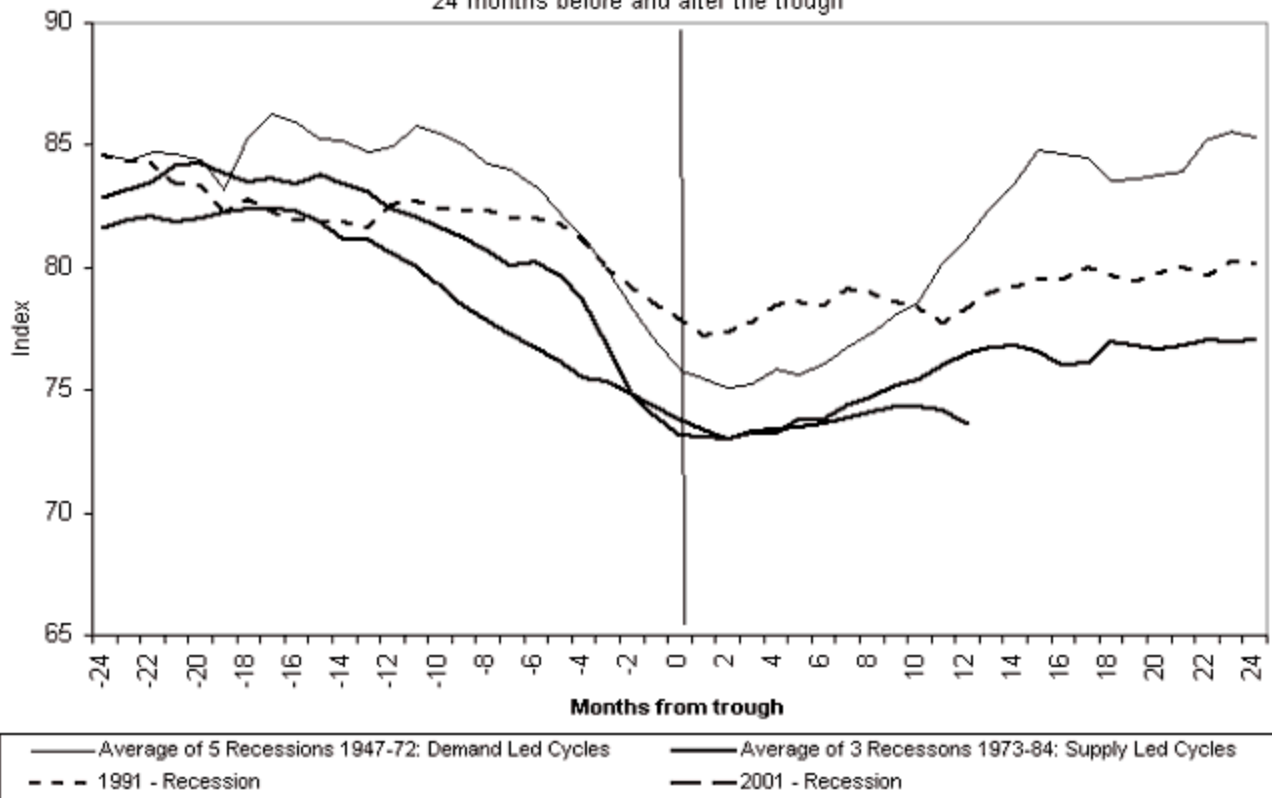
— Average of 5 Recessions 1947-72: Demand Led Cycles	— Average of 3 Recessions 1973-84: Supply Led Cycles
- - - 1991 - Recession	- . - 2001 - Recession

**Figure 3: Investment as a % of GDP**  
for eight quarters before and after the trough

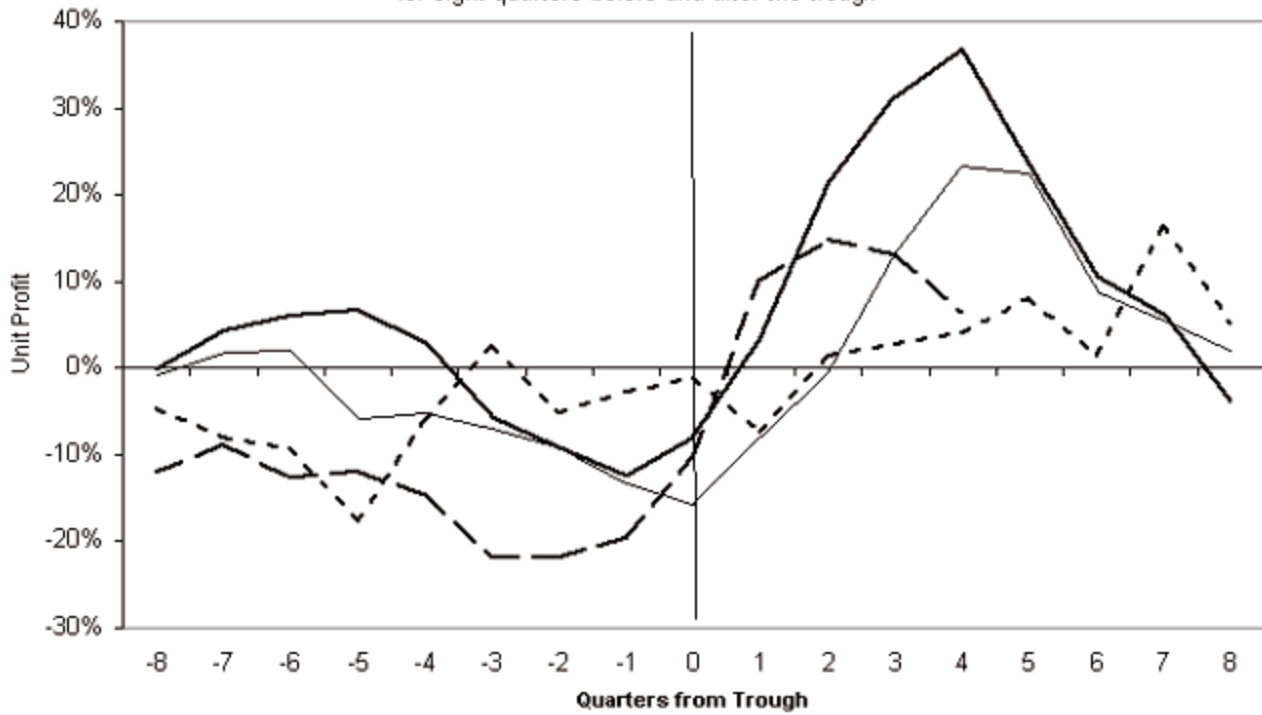


— Average of 5 Recessions 1947-72: Demand Led Cycles	— Average of 3 Recessions 1973-84: Supply Led Cycles
- - - 1991 - Recession	- . - 2001 - Recession

**Figure 4: Capacity Utilization in Manufacturing**  
 24 months before and after the trough



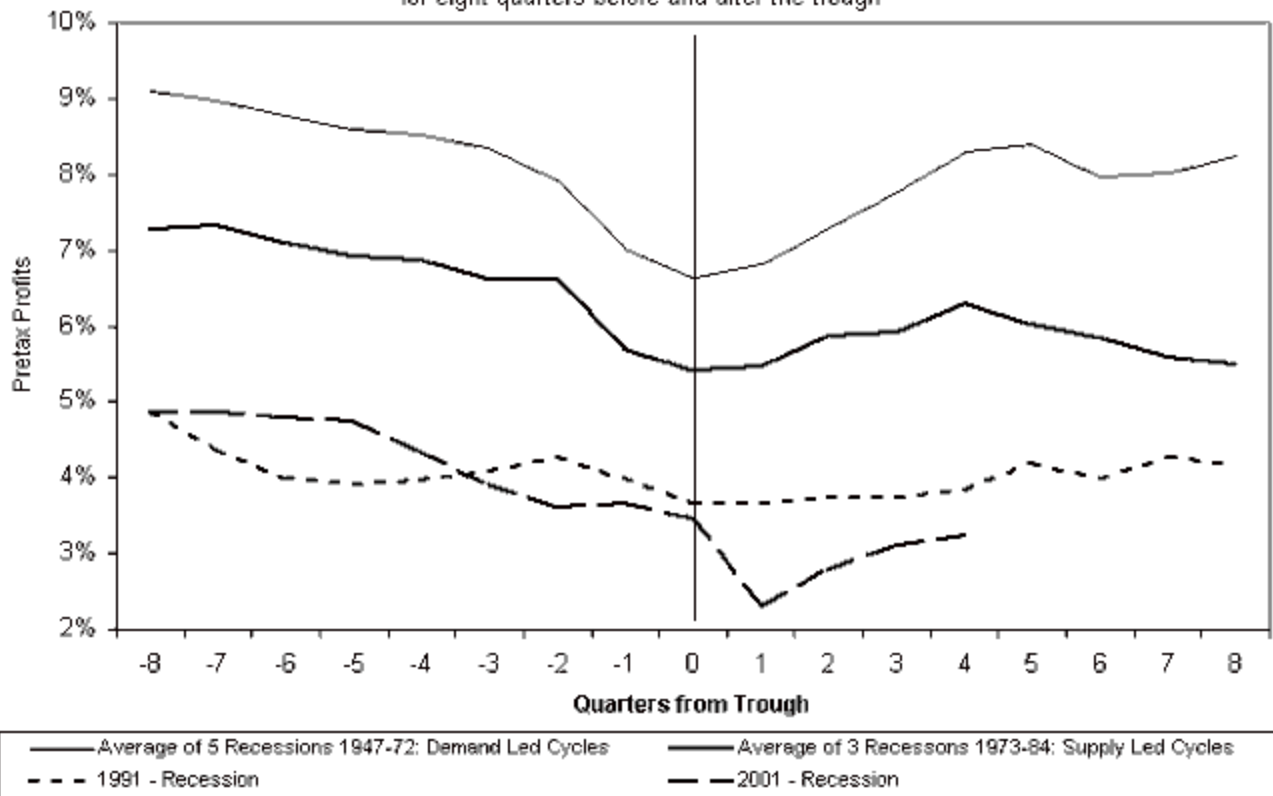
**Figure 5a: Corporate Unit Profit YoY**  
for eight quarters before and after the trough



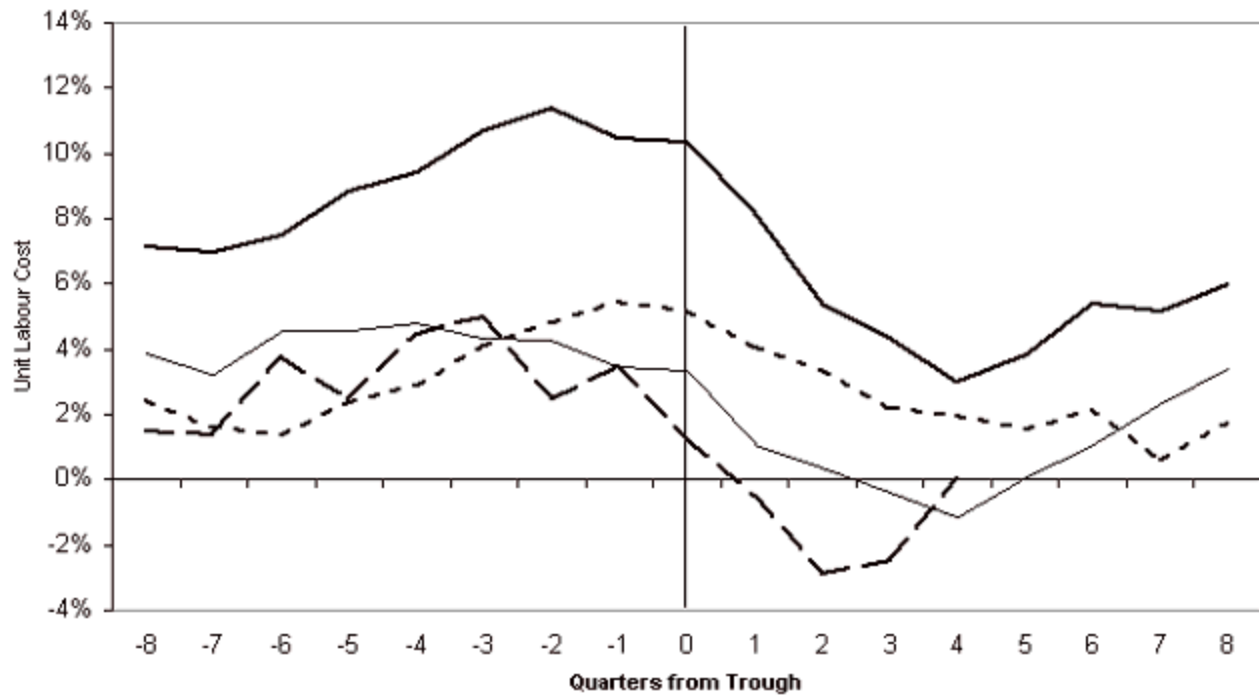
— Average of 5 Recessions 1947-72: Demand Led Cycles      — Average of 3 Recessions 1973-84: Supply Led Cycles  
 - - - 1991 - Recession      - - - 2001 - Recession



**Figure 5b: Corporate Sector Pretax Profits as % of GDP for eight quarters before and after the trough**

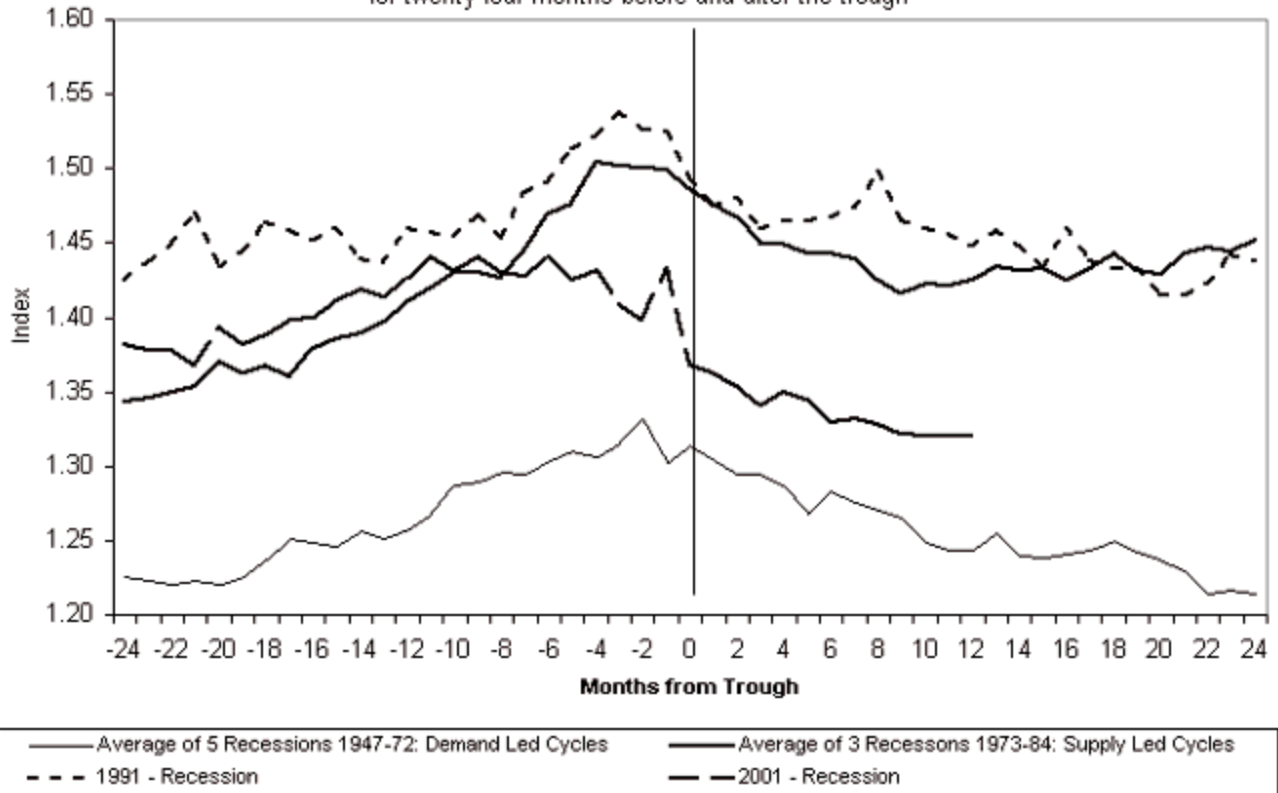


**Figure 6: Unit Labor Cost % YoY**  
for eight quarters before and after the trough

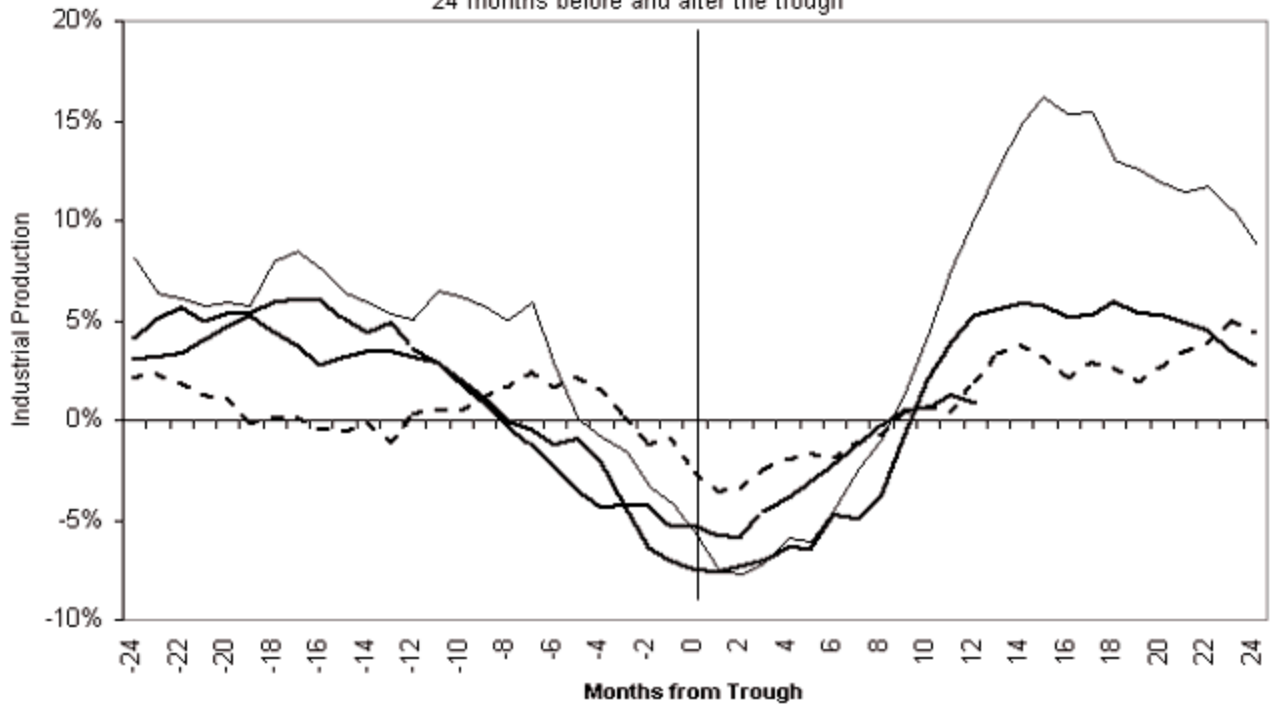


— Average of 5 Recessions 1947-72: Demand Led Cycles	— Average of 3 Recessions 1973-84: Supply Led Cycles
- - - 1991 - Recession	- . - . 2001 - Recession

**Figure 7: Inventory to Sales Ratio in Manufacturing**  
for twenty four months before and after the trough

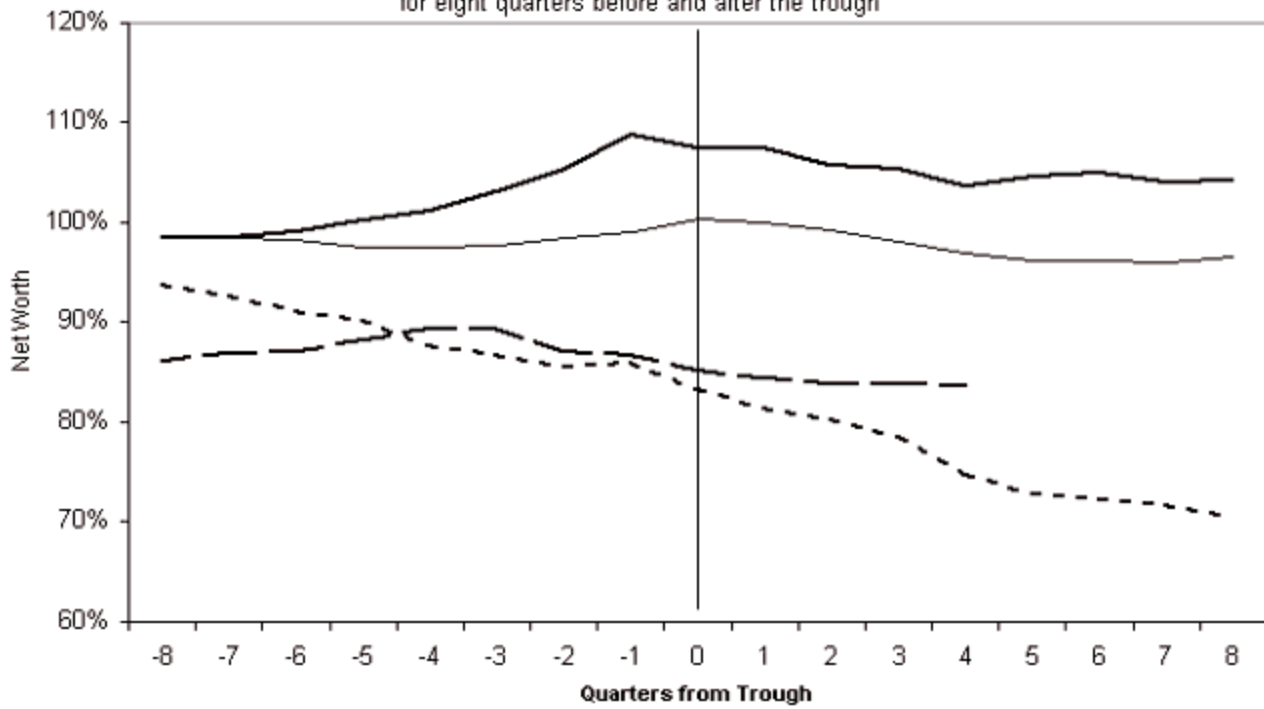


**Figure 8: Total Industrial Production % YoY**  
 24 months before and after the trough



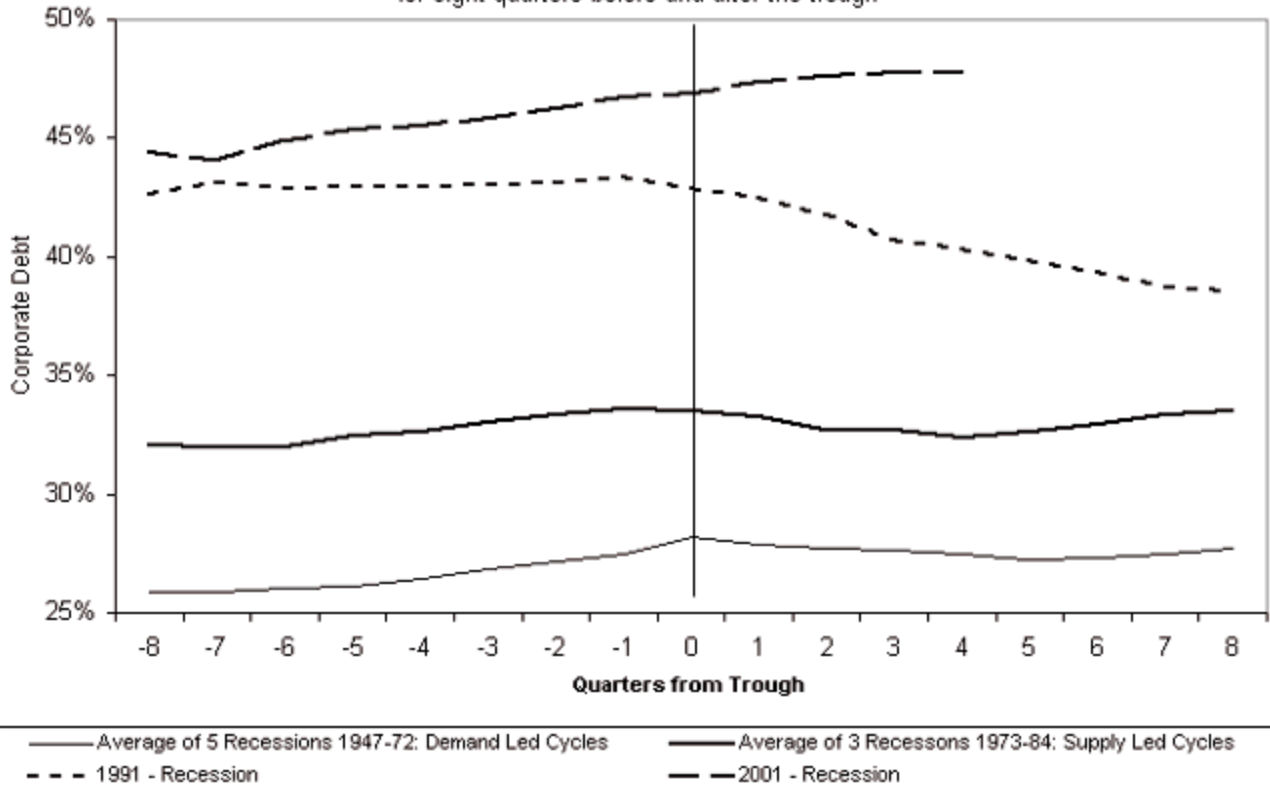
— Average of 5 Recessions 1947-72: Demand Led Cycles	— Average of 3 Recessions 1973-84: Supply Led Cycles
- - - 1991 - Recession	- . - 2001 - Recession

**Figure 9: Corporate Sector Net Worth as % of GDP**  
for eight quarters before and after the trough

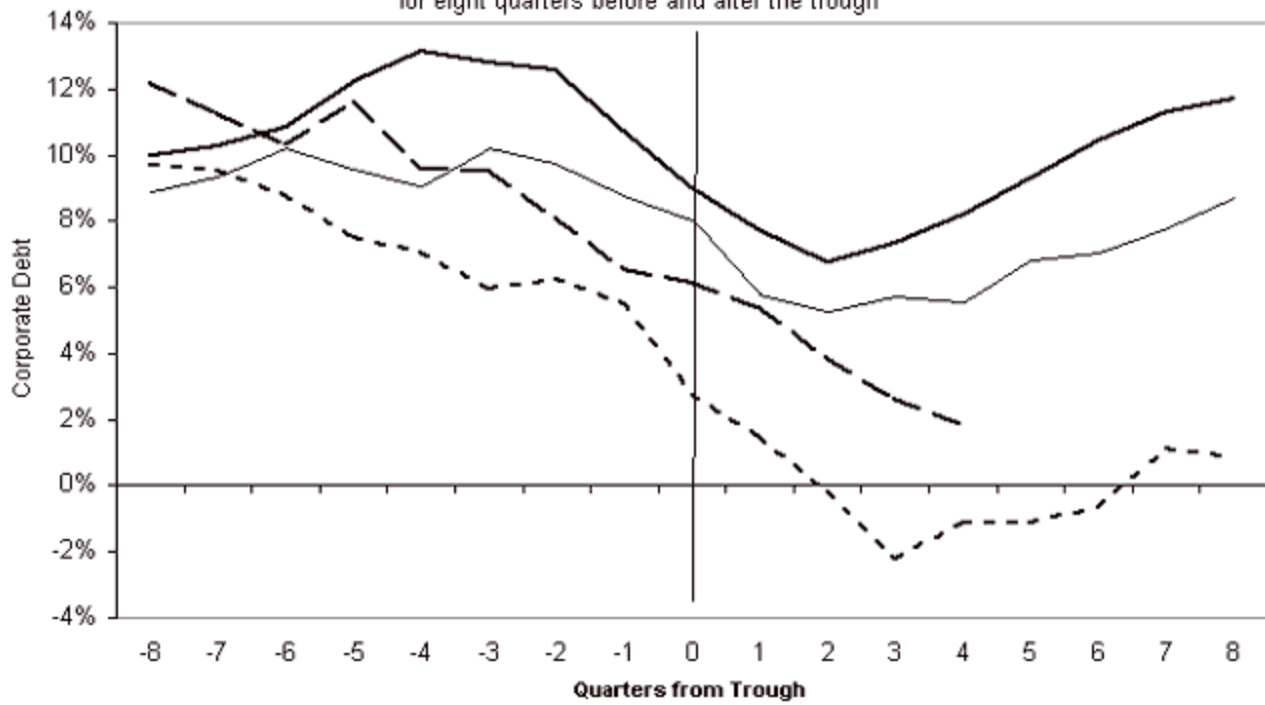


— Average of 5 Recessions 1947-72: Demand Led Cycles      — Average of 3 Recessions 1973-84: Supply Led Cycles  
 - - - 1991 - Recession      - . - 2001 - Recession

**Figure 10: Corporate Sector Debt as % of GDP**  
for eight quarters before and after the trough

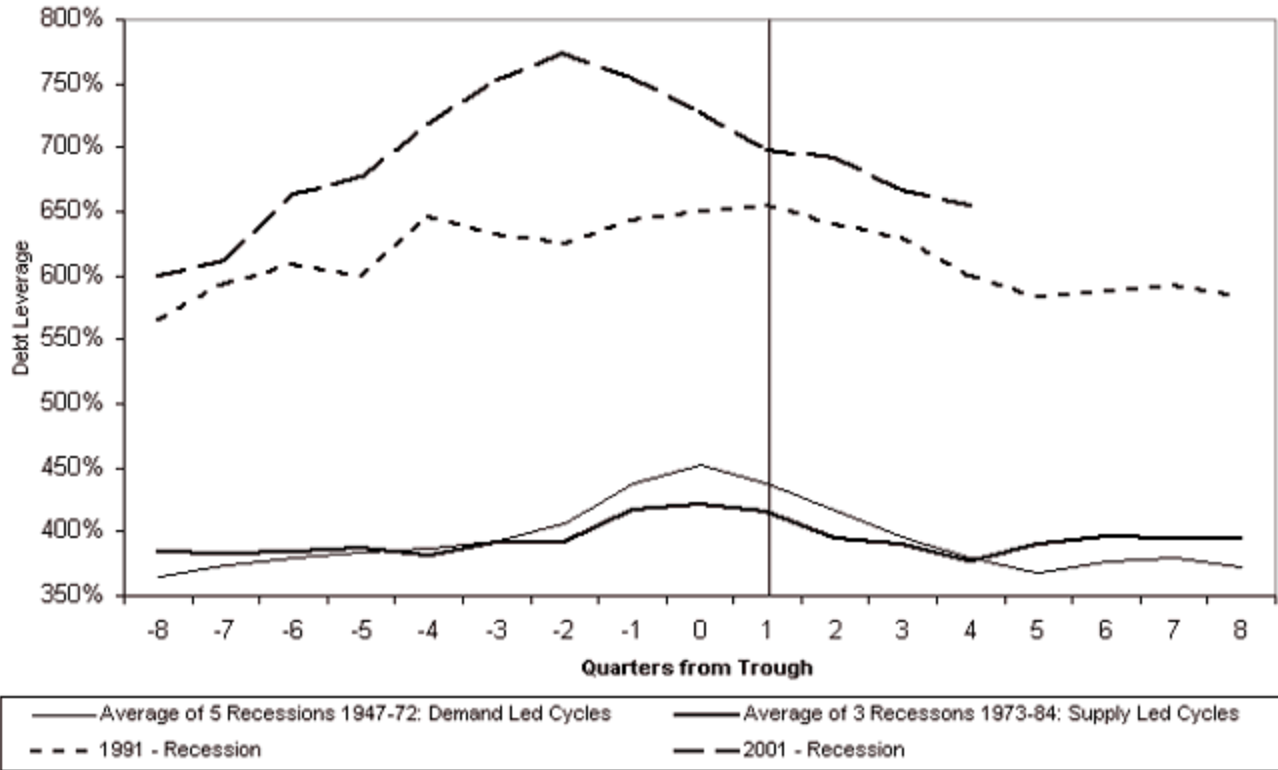


**Figure 11: Corporate Debt % YoY**  
for eight quarters before and after the trough



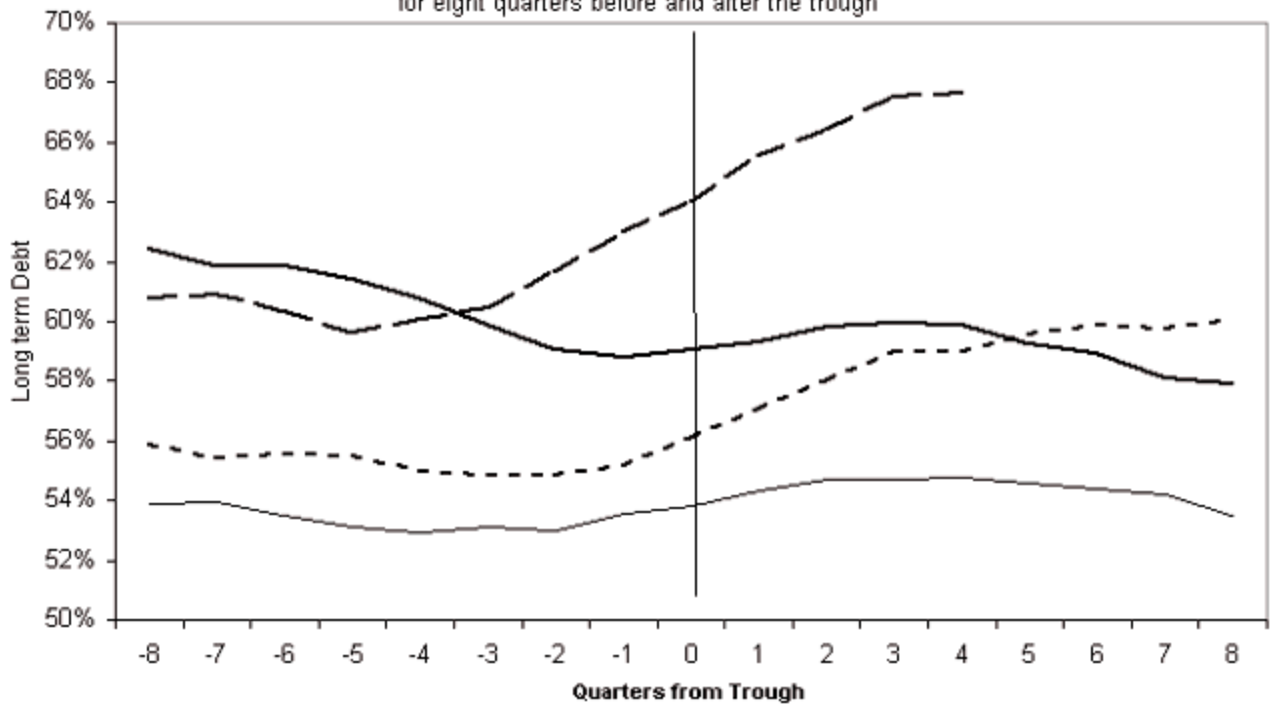
— Average of 5 Recessions 1947-72: Demand Led Cycles      — Average of 3 Recessions 1973-84: Supply Led Cycles  
 - - - 1991 - Recession      - . - 2001 - Recession

**Figure 12: Degree of Debt Leverage: Corporate Sector Debt as % of Internal Funds**  
for eight quarters before and after the trough



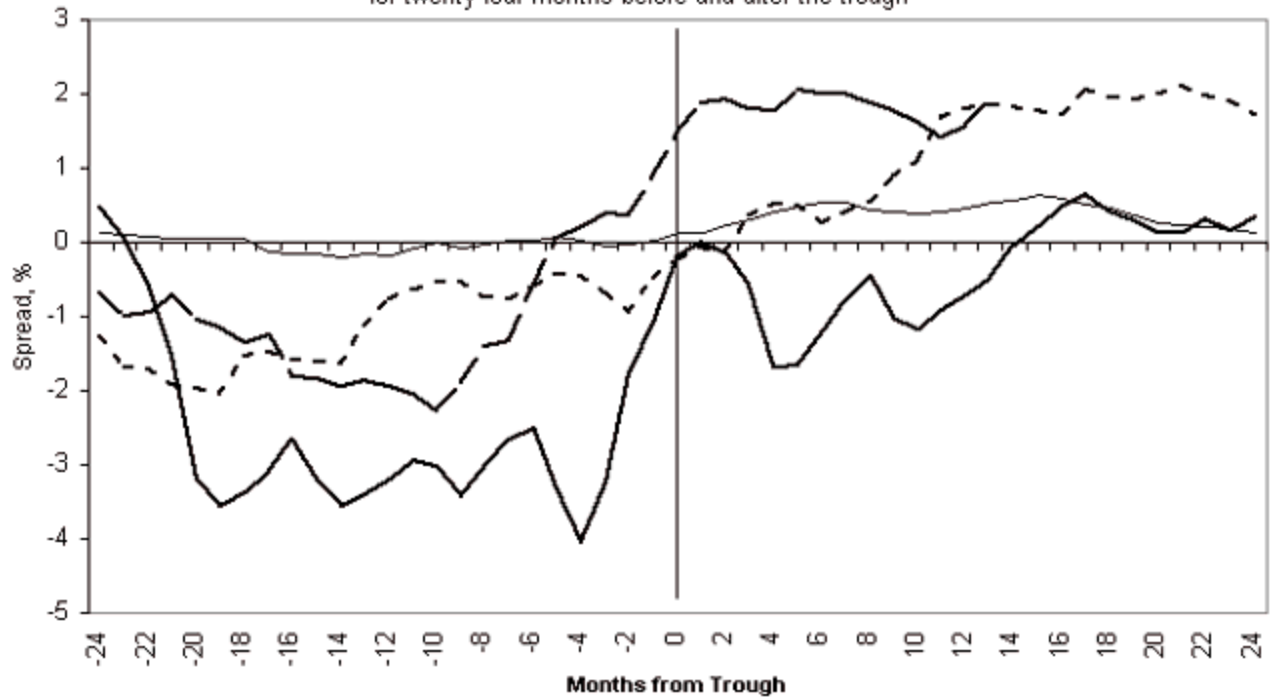


**Figure 13: Long-Term Debt (Securities & Mortgages) to Total Debt**  
for eight quarters before and after the trough



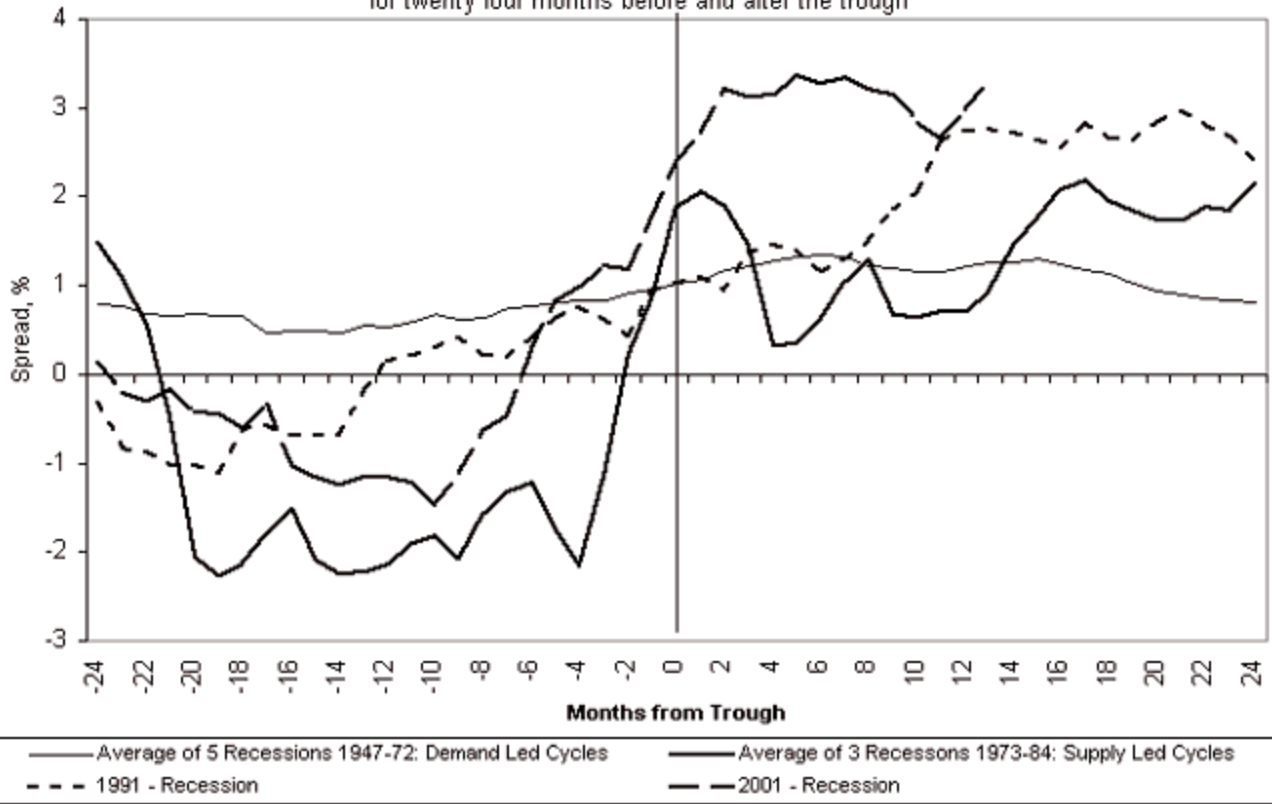
— Average of 5 Recessions 1947-72: Demand Led Cycles      — Average of 3 Recessions 1973-84: Supply Led Cycles  
 - - - 1991 - Recession      - - - 2001 - Recession

**Figure 14: Spread between AAA yield and Prime Lending Rate**  
for twenty four months before and after the trough



Average of 5 Recessions 1947-72: Demand Led Cycles
  Average of 3 Recessions 1973-84: Supply Led Cycles  
 1991 - Recession
  2001 - Recession

**Figure 15: Spread between Baa Yield and Prime Lending Rate**  
for twenty four months before and after the trough



**Figure 16: Interest Payments as % of Net Cash Flow**  
for eight quarters before and after the trough

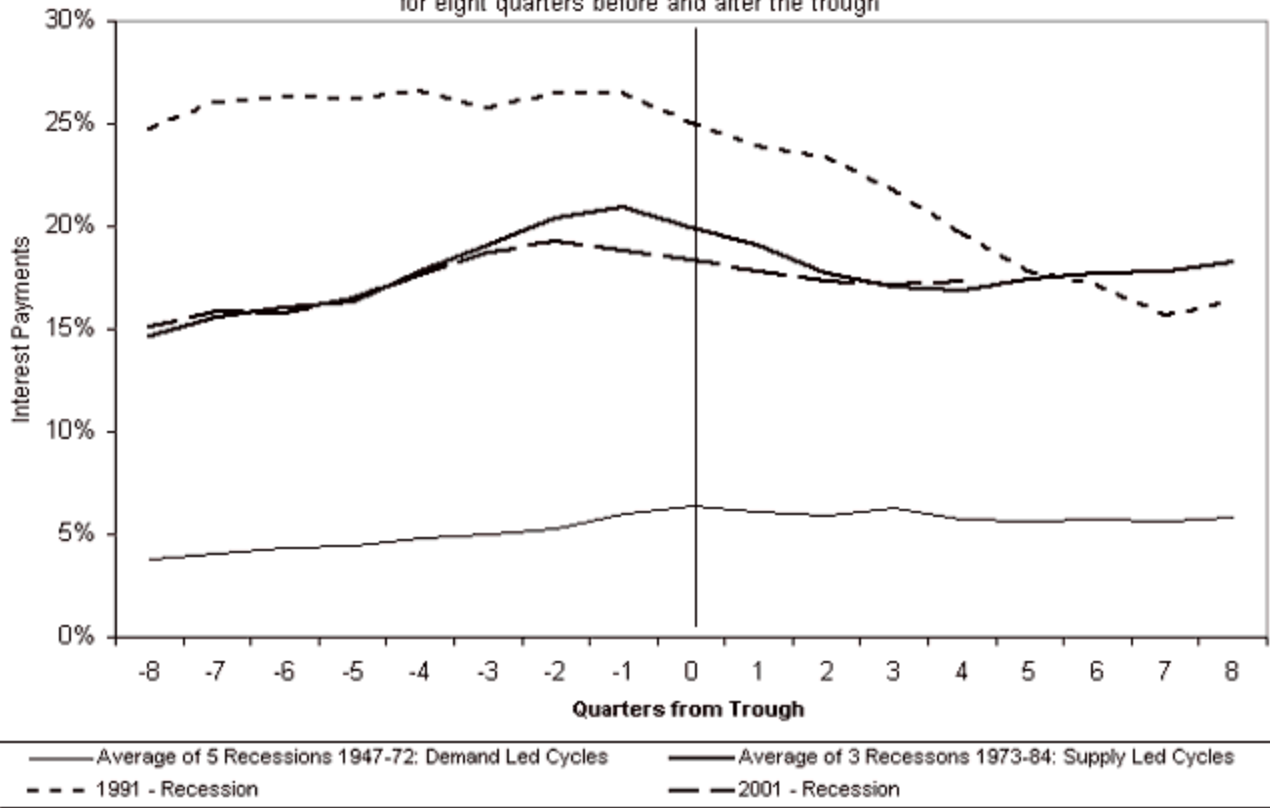


Figure 17: Level of Investment Historically and in Scenario II

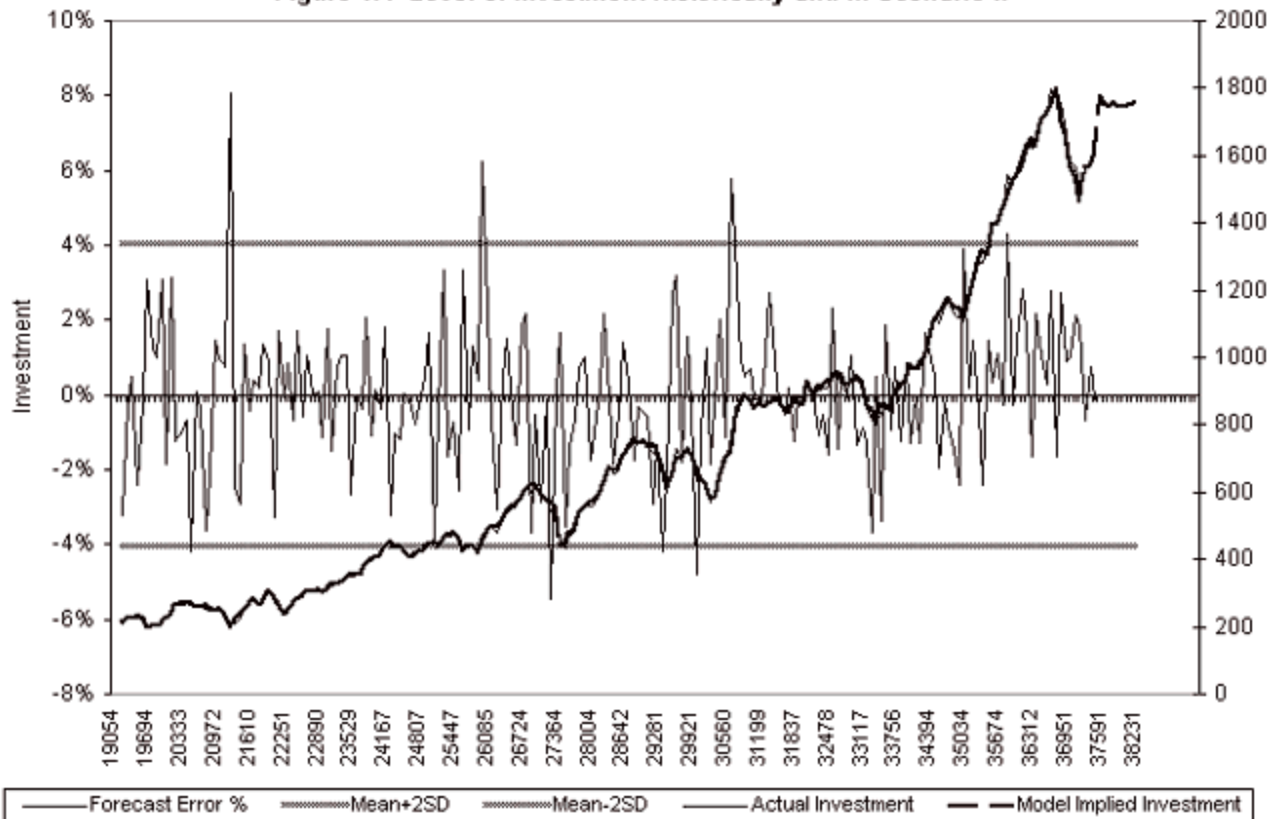


Figure 18: Investment Rate of Change Historically and in Scenario II

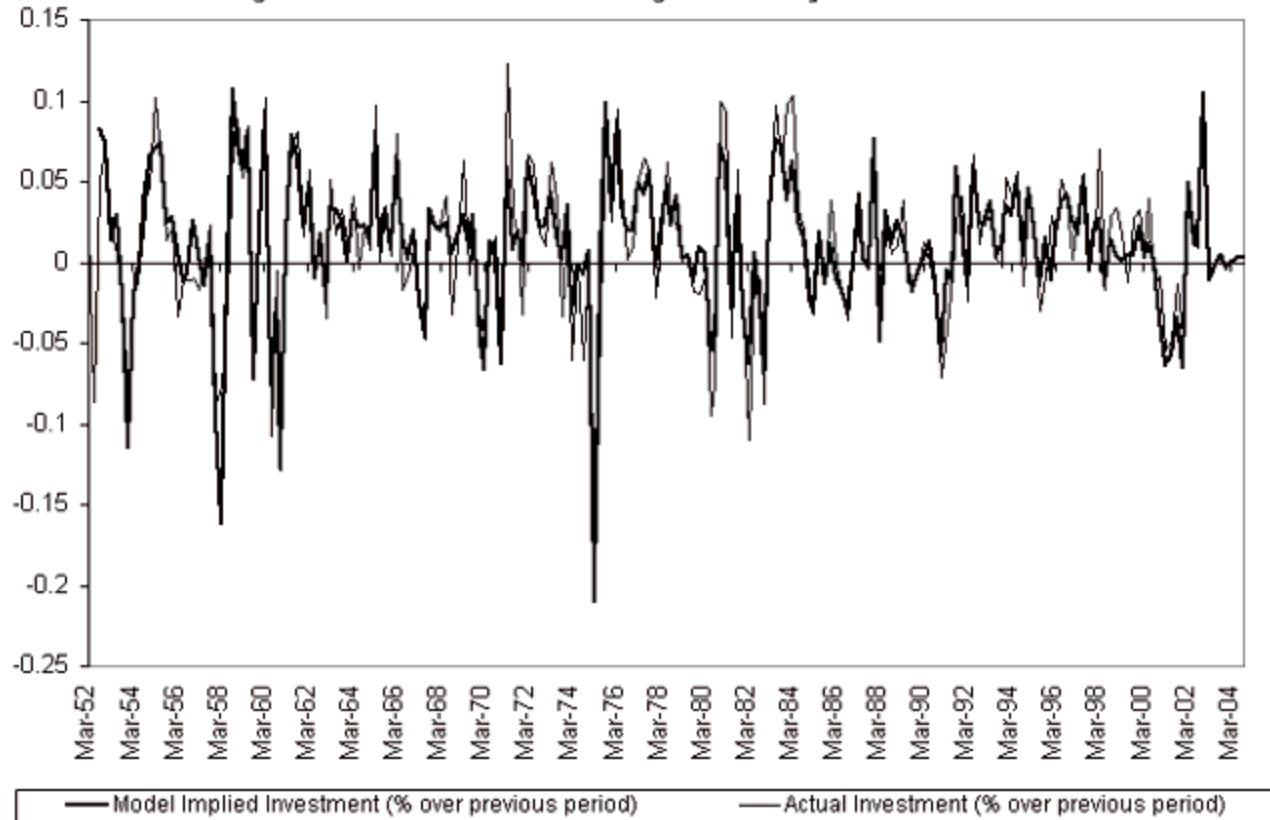


Fig. 19: U.S. Industrial Production

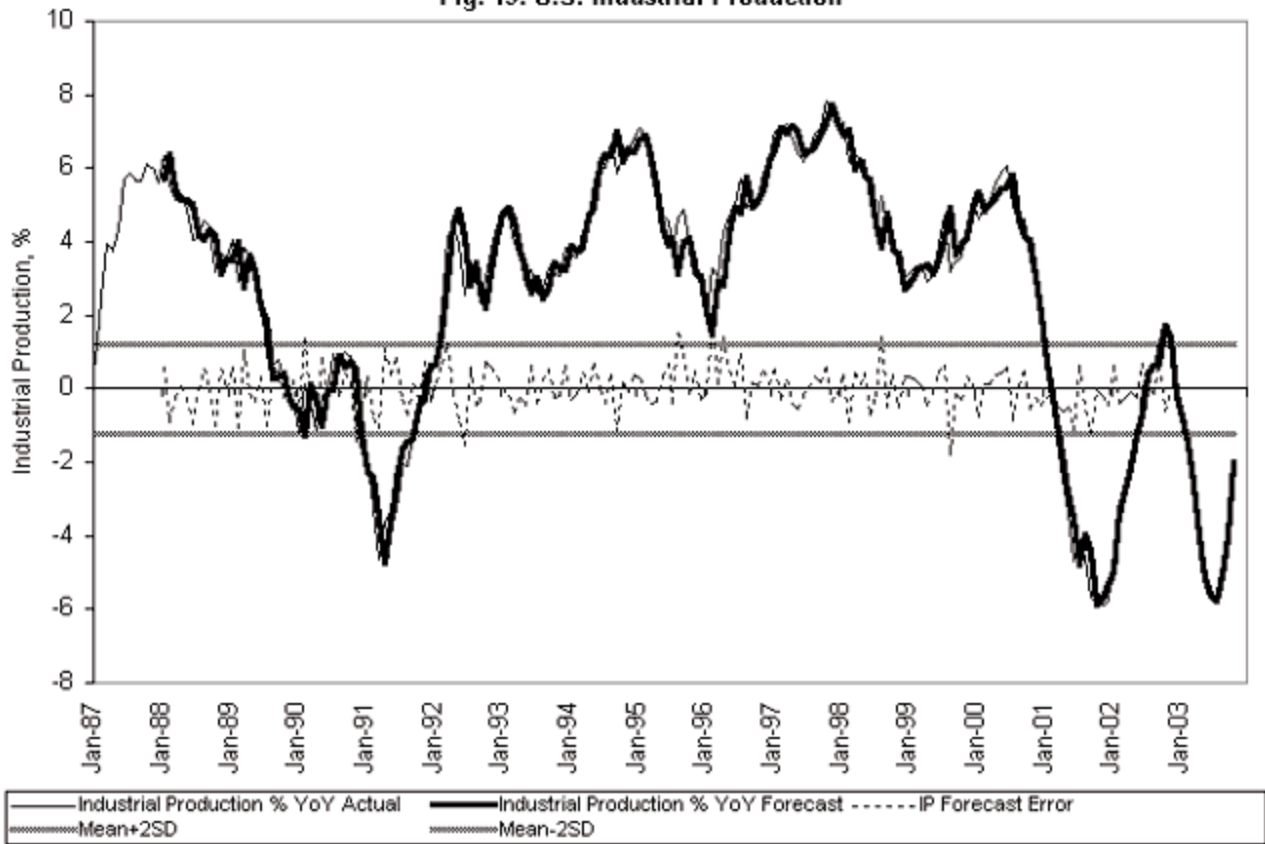


Fig. 20: Capacity Utilization Historically and in Scenario II

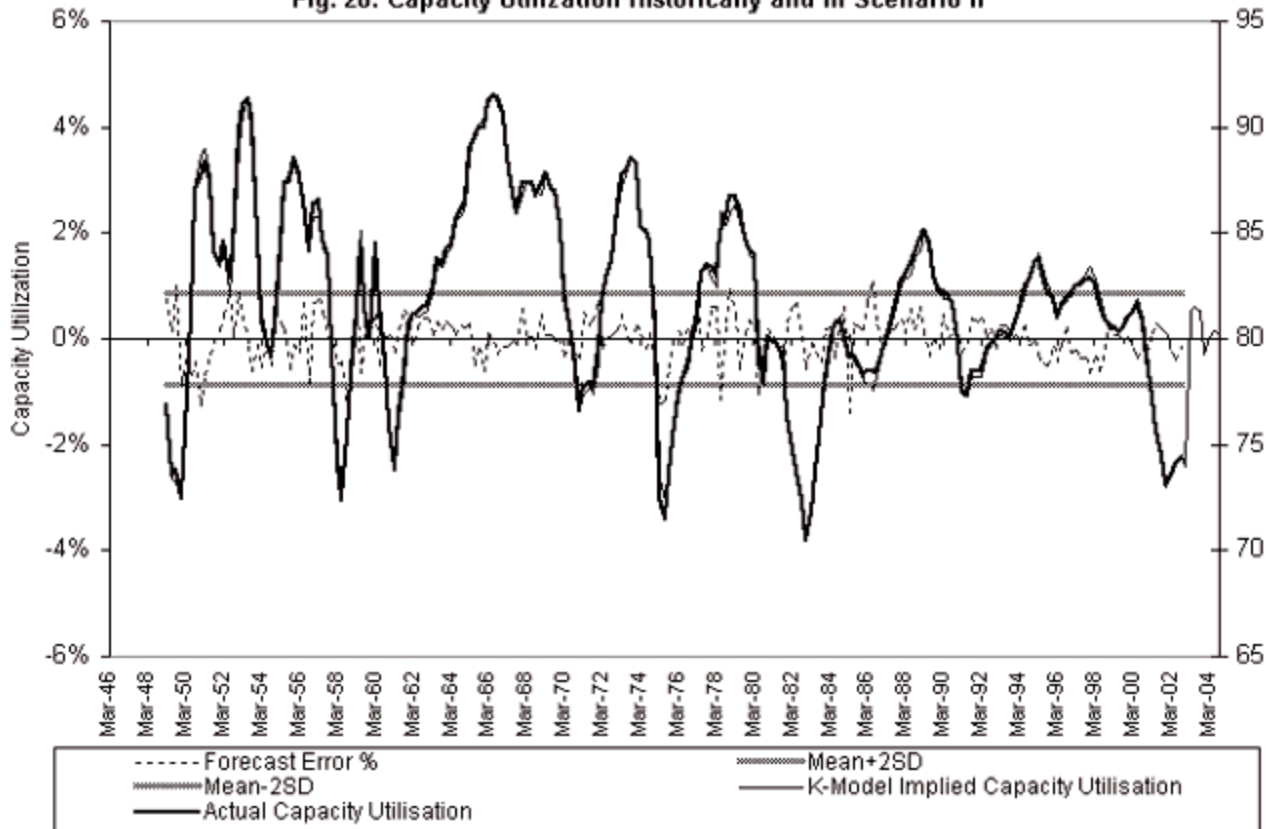




Figure 21: Debt to Capital Expenditure

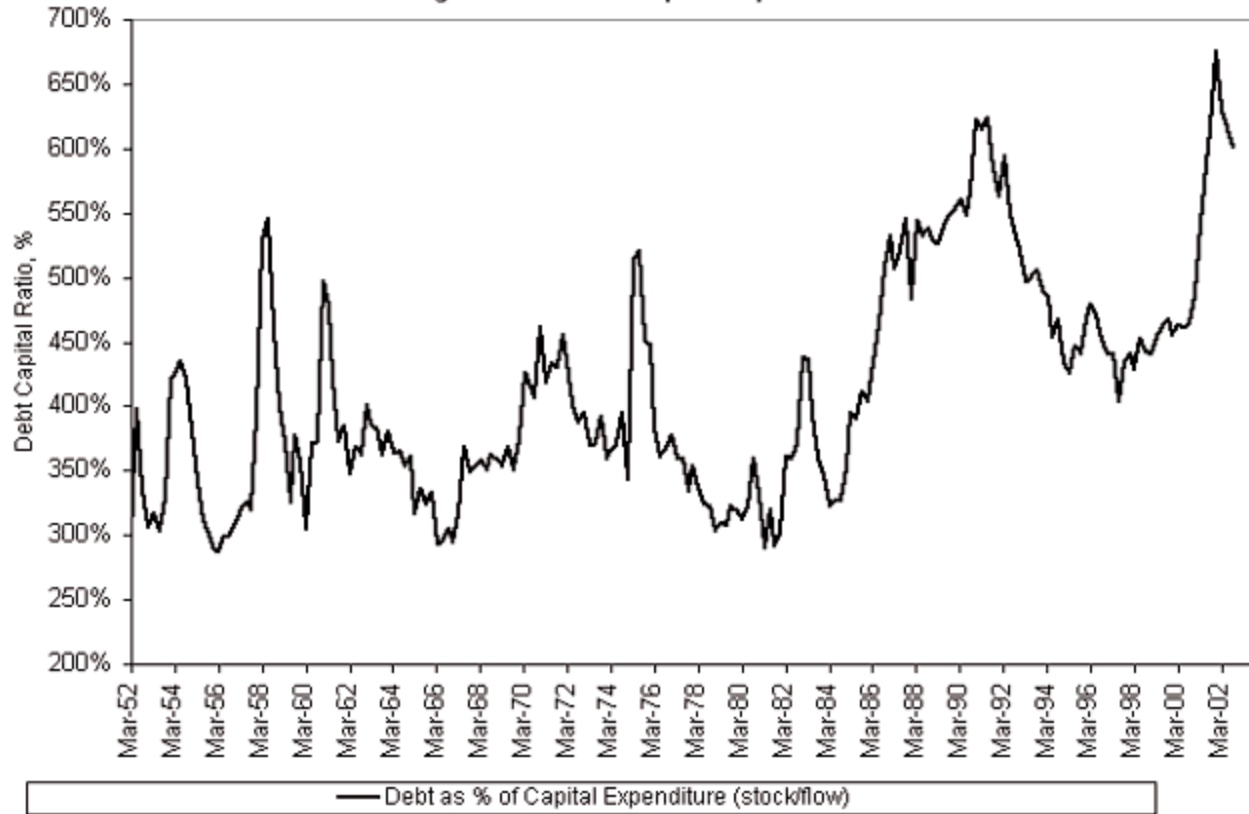
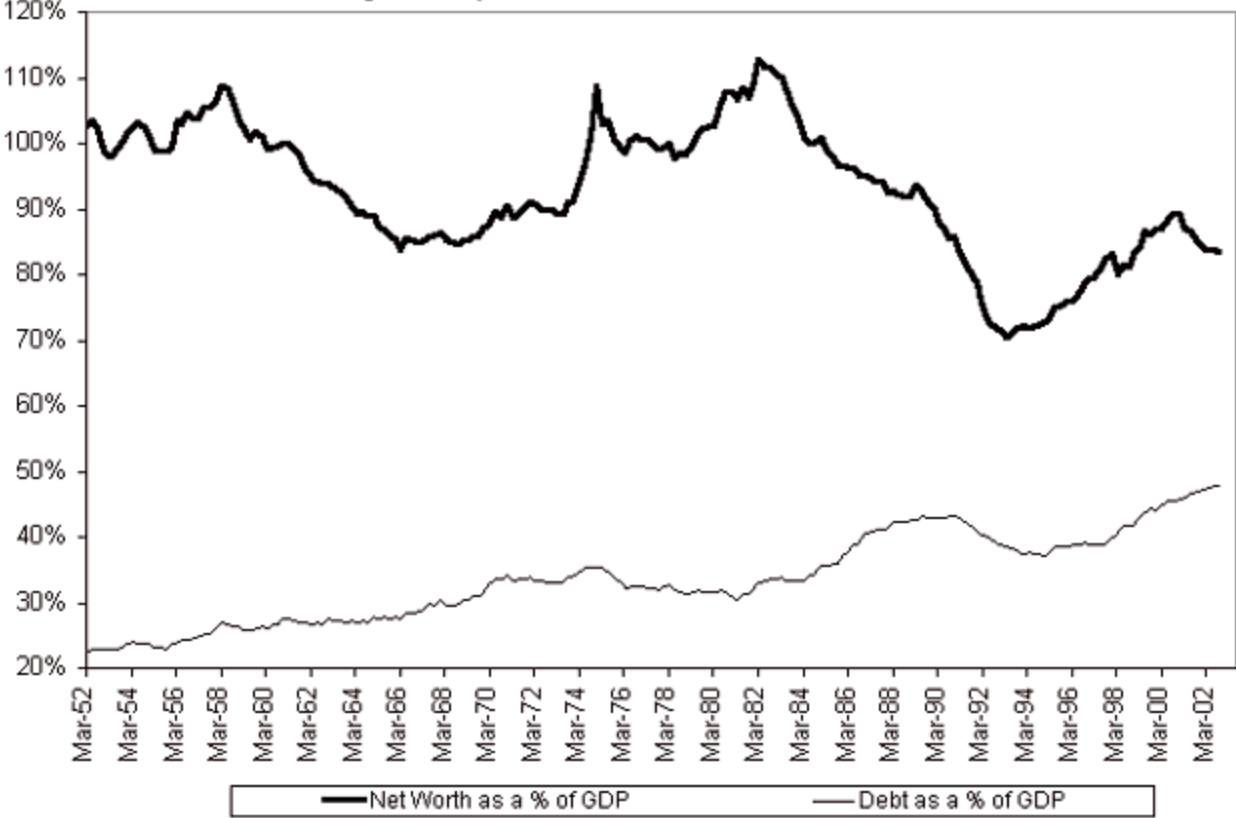


Fig. 22: Corporate Sector Net Worth and Its Debt



## APPENDIX 2: ESTIMATED EQUATIONS

<b>COINTEGRATED VECTOR FOR (IG)</b>				
Dependent Variable: LGI				
Method: Least Squares				
Date: 12/02/02 Time: 06:30				
Sample(adjusted): 1952:1 2001:1				
Included observations: 197 after adjusting endpoints				
<b>Variable</b>	<b>Coefficient</b>	<b>Std. Error</b>	<b>t-Statistic</b>	<b>Prob.</b>
C	1.430769	0.180477	7.927723	0.0000
LIP	0.786081	0.040885	19.22687	0.0000
LCP	0.260757	0.022084	11.80759	0.0000
CU	0.003825	0.001247	3.067963	0.0025
DEBTINV	-0.000261	7.61E-05	-3.426418	0.0007
RPLRFID(6)	-0.005092	0.001534	-3.318288	0.0011
NWGDP(2)	0.001090	0.000579	1.882846	0.0612
R-squared	0.992285	Mean dependent var	6.344857	
Adjusted R-squared	0.992041	S.D. dependent var	0.591444	
S.E. of regression	0.052764	Akaike info criterion	-3.011099	
Sum squared resid	0.528962	Schwarz criterion	-2.894437	
Log likelihood	303.5932	F-statistic	4072.844	
Durbin-Watson stat	0.254071	Prob(F-statistic)	0.000000	

<b>DYNAMIC SPECIFICATION FOR (IG)</b>				
Dependent Variable: DLGI				
Method: Least Squares				
Date: 12/06/02 Time: 09:33				
Sample(adjusted): 1952:3 2001:2				
Included observations: 196 after adjusting endpoints				
<b>Variable</b>	<b>Coefficient</b>	<b>Std. Error</b>	<b>t-Statistic</b>	<b>Prob.</b>
C	0.005071	0.003289	1.541733	0.1248
DLGI(-1)	0.251373	0.067881	3.703176	0.0003
ECM05(-1)	-0.077699	0.030143	-2.577642	0.0107
DLIP	0.446594	0.326725	1.366880	0.1733
DCU	0.005427	0.003719	1.459113	0.1462
DDEBTINV	-0.000820	6.44E-05	-12.73703	0.0000
DDEBTINV(-1)	0.000331	9.06E-05	3.654958	0.0003
DNW(-1)	0.001895	0.001104	1.716898	0.0877
DRPLR(-2)	-0.002317	0.001172	-1.977696	0.0494
R-squared	0.826592	Mean dependent var	0.010616	
Adjusted R-squared	0.819173	S.D. dependent var	0.047396	
S.E. of regression	0.020155	Akaike info criterion	-4.925947	
Sum squared resid	0.075960	Schwarz criterion	-4.775422	
Log likelihood	491.7428	F-statistic	111.4224	
Durbin-Watson stat	2.033692	Prob(F-statistic)	0.000000	

**CAPACITY UTILIZATION ESTIMATED EQUATION**

Dependent Variable: CU

Method: Least Squares

Date: 12/12/02 Time: 18:19

Sample(adjusted): 1949:1 2002:3

Included observations: 215 after adjusting endpoints

<b>Variable</b>	<b>Coefficient</b>	<b>Std. Error</b>	<b>t-Statistic</b>	<b>Prob.</b>
C	-0.676587	0.694996	-0.973511	0.3314
IP	0.807101	0.012431	64.92573	0.0000
LIP(-1)	-101.0042	3.098778	-32.59484	0.0000
LIP(-4)	101.2235	3.096824	32.68624	0.0000
CU(-1)	1.189558	0.032550	36.54528	0.0000
CU(-4)	-0.196824	0.028171	-6.986648	0.0000
R-squared	0.993960	Mean dependent var	81.75079	
Adjusted R-squared	0.993815	S.D. dependent var	4.535293	
S.E. of regression	0.356669	Akaike info criterion	0.803494	
Sum squared resid	26.58750	Schwarz criterion	0.897559	
Log likelihood	-80.37563	F-statistic	6878.472	
Durbin-Watson stat	1.546360	Prob(F-statistic)	0.000000	

<b>INDUSTRIAL PRODUCTION ESTIMATED EQUATION</b>				
Dependent Variable: IP				
Method: Least Squares				
Date: 12/13/02 Time: 22:27				
Sample(adjusted): 1988:02 2002:10				
Included observations: 177 after adjusting endpoints				
<b>Variable</b>	<b>Coefficient</b>	<b>Std.Error</b>	<b>t-Statistic</b>	<b>Prob.</b>
C	-1.262959	0.943922	-1.337990	0.1827
NAPM	0.069413	0.012426	5.586119	0.0000
NAPM(-12)	-0.041886	0.010803	-3.877230	0.0001
IP(-1)	0.943333	0.019528	48.30566	0.0000
R-squared	0.965420	Mean dependent var	2.767292	
Adjusted R-squared	0.964820	S.D. dependent var	3.250013	
S.E. of regression	0.609582	Akaike info criterion	1.870253	
Sum squared resid	64.28513	Schwarz criterion	1.942031	
Log likelihood	-161.5174	F-statistic	1609.954	
Durbin-Watson stat	2.208140	Prob(F-statistic)	0.000000	

## Notes

1. All Tables and Figures are in Appendix 1.
2. It ought to be noted, though, that Greenspan (2003) in his latest testimony, has modified his views in that out of all the proposed tax reductions by the Bush administration, he only supports that of dividends.
3. This definition of debt includes commercial paper, corporate bonds, bank loans, other loans and advances and mortgages.
4. The relationship between the rate of interest and investment is particularly important in the neo-classical investment theory (Jorgenson, 1971) and in Keynesian economics (Keynes, 1936). There are, of course, important differences between the two approaches: perhaps the most important is that while in neo-classical economics the relationship emanates from the attempt to determine the optimal capital stock, in Keynesian economics the relationship does not rely on invoking the optimal capital stock notion; uncertain expectations are by far the most important element in this approach (see, for example, Binswanger, 1999, where more details on this and other differences are offered). One other aspect refers to the relative importance between cost-of-capital and activity economic variables. It is generally recognized that activity variables, especially output, have "a more substantial impact on

investment" (Chirinko, 1993, p. 1881).

5. We include in this category the q theory of investment, introduced by Keynes (1936) and further developed by Brainard and Tobin (1968) and Tobin (1969, 1978).
6. The actual values of investment reported in Table 2 are very sensitive to the assumption that the recession will start in the next quarter. However, the percent change from base is not, provided the recession does not start significantly later, say after a year. Hence, on the assumption that the recession is imminent, meaning within a year, the percent changes from base are very meaningful numbers that summarize the effects of each scenario on, or its sensitivity to, investment.
7. In a recent survey 98 out of the 100 chief executives who belong to the Business Roundtable, once chaired by the newly appointed Secretary of State, confirmed that such incentives are largely irrelevant to their investment plans.