

INVESTMENT DEMAND AT FULL EMPLOYMENT

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The inadequacy of aggregate demand in the American economy of recent years has been most strongly marked in outlays for business fixed capital. As a fraction of GNP, business fixed investment -- the sum of nonresidential construction and producers' durable equipment -- had typically run between 10 and 11 percent in the years from 1947 to 1957; since 1958, it has remained consistently near 9 percent. In constant prices, the level of business fixed investment in 1962 still fell short of the 1957 peak, even though real GNP was 16 percent higher.

The weakness of fixed investment in recent years could be either cause or symptom of the slowdown in the progress of aggregate economic activity and is, almost certainly, both in part. The multiplier tells us that each dollar reduction of investment demand can account for a number of dollars of lost output. And the accelerator reminds us that much of investment depends on incentives to expand and will therefore be especially sensitive to a slackening in the growth of demand elsewhere in the economy. Hence, investment could easily fall as a share of total output in an economic slowdown that was generated entirely outside the capital goods sector.

There is no simple way by which we can hope to divide the recent weakness of investment into induced and autonomous portions. It is not important that we retrace history to make this allocation. As we tell our students, bygones are bygones in economics. But it is important to ask how much investment demand we can expect if somehow we do end the era of underutilization and return to an environment of full employment.

If investment can be expected to show much more buoyancy in a world of full utilization, there are many important implications to consider. In that event, it may be much easier to stay at high levels of utilization than to get up to them, since the extra orders, sales, and profits will generate their own reinforcements through added capital outlays. Indeed, the desirable push from fiscal policy appropriate to put the economy on the road to full employment would probably be too large and too strong once we were moving decisively in that direction. We should be prepared to reduce the expansionary contribution of policy over time lest we find ourselves fighting excess demand inflation. Optimism about the latent strength of investment is no argument for complacency, inaction, or piddling actions -- under those circumstances, the strength would continue to lie dormant, providing neither jobs nor growth. But it does argue that the needed big push is likely to be temporary. A full-employment surplus may be just around the

corner once the economy moves out of the rut and can turn the corner under its own power. So goes the optimistic view of potential investment--the "rut" view of the economy.

Now consider the opposite view. If, in a full employment situation, investment demand would show only little more than its present strength, full employment may require a persistent and sustained stimulus from stabilization policy. In that event, we are likely to have prosperity only if we are prepared to incur budgetary deficits even in periods of prosperity. The economy may move briskly so long as it is fueled by expansionary policy, but only under those conditions. Such a verdict would resemble Hansen's diagnosis of a generation ago. I will leave it to others to decide whether a "stagnationist" label should be applied to such a view, as well as to debate how unhappy we should be if this turned out to be the correct verdict.

If investment has only minor latent strength, it is probable that full employment would be achieved only in a high consumption economy. I say "probable" rather than "inevitable." In the first place, it is still possible to achieve a higher investment share through an expansion of public investments. So long as there are highways, hospitals and schools to be built which expand our future productive capacity and which do not deter private incentives to invest, society can implement a desire for a greater capital stock by more public investment. Secondly, even if investment did not flourish along a full employment path, it might be nurtured by specific policy measures, like easy money and preferential tax treatment. There are a host of possible specific measures to stimulate investment -- untried, untrue, and unlikely to be legislated in the near future but nevertheless worth considering; for example, a government guarantee system for business loans analogous to FHA; or a tax reform that perfected loss offsets and thereby removed a tax-deterrent to risk-taking. Nevertheless, as a first approximation, the more bearish we are about the strength of private investment demand, the more we must rely on the consumer to bring the economy to full utilization.

The level of investment and the rate of economic growth are related: a bullish judgment on the investment share of output tends to be an optimistic verdict on our possibilities for growth. But we have to watch our *ceteris paribus* carefully. For example, if capital goods became shorter-lived and less durable, the resulting increase in replacement requirements would bolster

investment demand; yet it would not be a boon to the growth of productive capacity. Alternatively, a wave of intense capital-saving innovations would accelerate the growth of potential output but might depress investment demand sharply. In this paper, I am concerned with the demand side of investment; inferences about the supply or capacity-generating side should be drawn cautiously, if at all.

Investment is obviously crucial to the supply side of the economy; but since I am concerned with demand, my concentration on business fixed investment needs to be justified. Dollars spent for other types of output put men and machines to work just as readily and reliably as outlays for plant and equipment. Even though capital outlays have played a key role in our departure from full employment, it does not follow that they deserve special emphasis in appraising our chances of returning to full employment. The main reason for spotlighting fixed investment in the appraisal of full employment patterns and possibilities is that we know so little about it. The room for research and debate is quantitatively much greater than for other components. If we settled on a particular level of GNP as full employment, I think we would rather readily agree on the quantitative magnitudes of most segments of national expenditure at that level of output. Suppose you accept my view that, in 1962, GNP corresponding to a four percent unemployment rate would have been \$585 billion or \$30 billion above actual output, and suppose further we agree to call that "full employment." (I am certain that we could profitably debate these issues, but I wish to avoid that debate here.) Now, I should be prepared to suggest that, with an added \$30 billion of income-generation in 1962:

- a.) Consumption would have exceeded its actual level by about \$15 billion, reflecting higher disposable incomes and little or no change in the personal saving ratio.
- b.) Residential construction would have been about \$1 billion above its observed level, assuming that monetary conditions were unchanged.
- c.) Inventory investment was, in fact, \$5.5 billion or 1.0 percent of GNP -- just about what would be expected along a sustained full employment path.
- d.) Net exports would have been fractionally below the actual level of \$3.8 billion, as a result of higher imports at full employment.

- e.) With government purchases remaining at their actual level, the Federal budget on a national income basis would have shown a surplus of about \$5 billion instead of its actual \$4 billion deficit.

Give or take a billion or two, these seem to be reasonable, relatively safe numbers. There is no similarly reliable answer for business fixed investment. On the basis of the extra consumption (and other minor adjustments) listed above, it follows that \$30 billion of extra output would have left room for an additional \$14 or \$15 billion of business fixed investment. To strike the balance between aggregate demand and potential supply at the \$585 billion level of GNP, fixed capital spending would have had to be about \$64 billion or 11 percent of potential output. In fact, at \$50 billion, it was 9.0 percent of actual GNP. If 1962 had unrolled as part of an era of full utilization, would the demand for capital goods have measured up to \$64 billion? Or 60? Or 55? Or merely 52?

I have spent long enough defining the question at hand and explaining its importance. Now, let me turn to the more difficult task of trying to supply an answer. The ideal way to get an answer can be expressed in a very simple recipe: take the true investment demand equation for the economy; plug in full-employment values for all the independent variables; then calculate the corresponding value of the dependent variable and that number is investment demand at full employment. The missing ingredient is, of course, the "true" investment function. I can offer a number of equations which provide reasonably good fits to postwar data, but they leave much to be desired in their reliability and accuracy. The investment equations presented below are chosen as prototypes, representing different views of the determination of capital outlays. They cannot be billed the "best" possible equations, on the strength of either logic or goodness of fit.

I shall discuss the implications of these equations for a full employment situation, using a hypothetical 1962 at full employment for illustrative purposes. There are many problems in adjusting last year's data to a full employment situation, but it is still a simpler matter than if the same experiment were applied to a future year. That is why I choose to look at our investment potential in the future by looking back toward 1962. At the risk of compounding a felony, I shall assume throughout that the gap between potential GNP and actual GNP for 1962 was \$ 30 billion, following

the analysis I presented to the ASA meetings a year ago.* Most of the numerical results

* "Potential GNP: Its Measurement and Significance," in American Statistical Association, 1962 Proceedings of the Business and Economic Statistics Section, pp. 98-104. (Reprinted as Cowles Foundation Paper, No. 190.)

can, nevertheless, be easily adjusted to different estimates of the gap. Only a major difference in the estimated gap will affect the qualitative character of the results.

Profit equation:** The least bullish

** I am indebted to Daniel Radner for assistance in obtaining the empirical results reported below.

appraisal of capital outlays at full employment comes from an extreme profit view of investment. The following equation explains business fixed investment (I) with corporate profits after tax (P), lagged one, two, and three quarters; and with corporate capital consumption allowances (CCA) lagged two quarters. It is fitted to quarterly data for 1948 to 1961, expressed in billions of current dollars, seasonally adjusted at annual rates:

$$I_t = 11.6 + .407 P_{t-1} + .106 P_{t-2} + .120 P_{t-3} + .871 CCA_{t-2}$$

$$(R^2 = .885)$$

Statistical work I have done on the relationship between profits and GNP suggests that profits before tax would have been \$55-1/2 billion last year if potential GNP of \$585 billion had been realized. At the actual GNP of \$555 billion, profits before tax were \$47 billion; the full-employment estimate implies that profits would have been higher by between 25 and 30 percent of the extra \$30 billion of GNP. The potential level of profits after tax is correspondingly estimated at \$29.2 billion compared to the actual level of \$24.8 billion. When the P variable in the above equation is set at the estimated potential levels, investment demand

at full employment is calculated as \$55 billion -- in contrast with the actual \$50 billion; the implied full employment ratio of fixed investment to GNP is 9.4 percent.

Sources-of-funds equation: A slightly larger estimate of potential investment demand emerges from a financial view of the capital spending decision. The equation below explains business fixed investment by the availability of internal and external funds. Internal sources are represented by corporate cash flow (F) -- the sum of profits after tax and capital consumption allowances -- with lags of one, two, and three quarters. (When lags of four and five quarters were also included, the coefficients were negligible in size.) External sources are reflected by the BAA bond yield (R) and the earnings-price ratio on common stock (E); both of these are expressed in percentage points and lagged two quarters. Again, the data are quarterly and the period of fit is 1948-61:

$$I_t = 21.2 + .432 F_{t-1} + .258 F_{t-2} + .263 F_{t-3} - .338 E_{t-2} - 3.537 R_{t-2}$$

$$(R^2 = .918)$$

I shall assume that earnings-price ratios and bond yields in 1962 would not have been altered by full employment. Also, depreciation is taken at its actual level. Then, each F term must be adjusted to reflect potential -- rather than actual -- after-tax profits. When this is done, potential investment demand is given as \$56 billion. The calculated full employment ratio of investment to GNP is 9.6 percent.

Eclectic short-lag equation: Neither the profit nor sources-of-funds equation makes any allowance for the deterrent effects of excess capacity on investment demand. For that reason, it may not be surprising that they produce bearish verdicts on potential investment demand. Full employment would do more than add to corporate profits -- it would also put idle plant and equipment to work and create pressures and incentives to expand. The next equation contains an excess capacity measure as an explanatory variable. That measure is related to "excess labor capacity" rather than to plant and equipment. The variable (X) is GNP multiplied by the excess of the unemployment rate over 4 percent. It fits better than direct measures of excess capital capacity. This may not be so surprising when we remember that our direct estimates of capital utilization apply only to manufacturing. The other explanatory variables are GNP and corporate cash flow (F). I used this equation originally as a benchmark

to compare with the predictive value of the quarterly Commerce-SEC anticipations data for 1948-61 (Okun, AER, May, 1962, p. 224); hence, the dependent variable is Commerce-SEC plant and equipment outlays (PE) rather than the GNP component of business fixed investment.

The independent variables were each lagged one quarter. Obviously, such a short and simple lag cannot do justice to the time-consuming and complex investment decision. But the obvious misspecification of the lag structure need not be fatal to the full-employment estimates generated by the equation:

$$PE_t = 1.1 + .051 GNP_{t-1} - .341 X_{t-1} + .249 F_{t-1}$$

$$(R^2 = .92)$$

For the four quarters of 1962, the average subtraction from PE resulting from the X term was \$3.5 billion. That subtraction disappears at full employment. In addition, plant and equipment outlays at full employment are stimulated by higher values of GNP and F according to the equation. The full employment estimate of PE is \$45 billion; the actual 1962 level was \$37.3 billion. Now a further adjustment is needed since business fixed investment is a larger total than Commerce-SEC plant and equipment outlays--larger by one-third, or \$12.7 billion, in 1962. Past experience would suggest that the portion of business fixed investment not covered by the Commerce-SEC survey is responsive to business conditions, but less sensitive than the covered part. An appropriate estimate of potential investment demand is then \$59 billion.

Adjusting for 1962 residuals: In each of the three equations above, I took the altered independent variables appropriate to full employment and then estimated investment. This technique implies that the equations would have estimated investment without error -- or at least without bias -- in the hypothetical full-employment 1962. However, they were off the mark somewhat in the actual economy of 1962. Strikingly, each of the equations overestimated 1962 capital outlays by \$2 billion, placing them at \$52 billion. A good case can be made that this \$2 billion shortfall in 1962 investment reflects the long-term effects of continued slack in the economy on business attitudes, enforcing conservatism and an unwillingness to build ahead of demand. Such effects would not be represented in the short-term determinants of investment that appear in the equations. If, however, the \$2 billion residual would be expected to appear in a full-employment

environment, the estimates of full-employment investment above would be lowered to \$53, \$54, and \$57 billion, respectively.

Gap equation: The "eclectic short-lag" equation gives a less bearish estimate of full employment investment than the alternatives because of its excess capacity variable. It turns out that an even higher estimate can be obtained by an equation which takes excess capacity as the sole determinant of the investment share of output. For the excess capacity variable, I have again chosen the gap between potential GNP and actual GNP with potential GNP in constant prices calculated along a 3-1/2 percent trend line through the actual GNP of mid-1955. In particular, the explanatory variable in the equation below is the average gap as a percentage of actual GNP during the preceding four quarters:

$$\bar{G}_t = \frac{1}{4} \cdot \sum_{\theta=1}^4 \left[\frac{\text{Potential GNP in } (t-\theta)}{\text{Actual GNP in } (t-\theta)} - 1 \right]$$

The dependent variable is the ratio of business fixed investment to actual GNP, expressed as a percentage (I/GNP). The equation has been fitted in two ways: one with I and GNP in current prices; and the other, with the variables in 1954 prices. The period covered is 1955-62, containing 32 quarterly observations.

Current prices:

$$\frac{I_t}{GNP_t} = 10.87 - .265 \bar{G}_t \quad (r^2 = .907)$$

1954 prices:

$$\frac{I_t}{GNP_t} = 10.39 - .270 \bar{G}_t \quad (r^2 = .927)$$

According to the current price variant, investment would be 10.87 percent of GNP at sustained full employment; or, for a hypothetical 1962 full-employment world, would be \$64 billion. The 1954 price variant yields the same \$64 billion figure when applied to the potential output and actual prices of 1962. Since the capital goods deflator for 1962 on a 1954 base exceeded the GNP deflator by 5.2 percent, the estimated 10.39 percent in 1954 prices translates into 10.93 percent in 1962 prices.

The gap equation thus yields a considerably more bullish estimate of potential investment demand than the other functions reported above. Its estimate of capital outlays at full employment also topped several other investment

equations I examined. I therefore view its estimate as an upper limit on the plausible range. Even so, the lower and upper limits are unfortunately far apart. Investment equations which make analytical sense and which fit the data about equally well present very different estimates of potential investment demand. It is somewhat discouraging to report that full-employment investment demand, as applied to 1962, lies somewhere between \$55 -- or even \$53 -- and \$64 billion. But the breadth of this range reflects the breadth of our ignorance.

Capital stock approach: The Commerce Department's capital stock estimates provide evidence against choosing the upper end of the range as most likely.* The gross stock of

* Jaszi, Wasson, and Grose, "Expansion of Fixed Business Capital in the United States," Survey of Current Business, November, 1962.

business plant and equipment is estimated on two assumptions about service lives -- one follows the Treasury's Bulletin F of 1942; the other follows average business accounting practice, using lives that are 20 percent shorter than those of Bulletin F.

The shorter-life version presents a particularly bearish view of investment potential. It shows the gross stock growing only a little more than one percent a year since 1956-57. Meanwhile, the number of persons engaged in the private sector has grown by 0.3 percent a year. Thus, capital per person employed has grown no more than one percent a year. Moreover, excess industrial capacity has developed -- capital per man is apparently above the level preferred by businessmen today and apparently was not above the desired level in 1956. It thus seems that the annual rate of growth of capital per man desired by firms in recent years has been less than one percent a year. Such a low targeted growth of the capital-labor ratio would imply a marked continuing decline in the capital-output ratio and a relatively low share of investment in GNP, even at full employment.

Accepting the Commerce data, one is obliged to conclude that we began the postwar era with

capital per man far below the businessman's target -- perhaps, 20 percent too low. Then business seems to have made up this deficiency gradually during the 1947-57 decade, generating a rapid growth of the gross capital stock and of capital per man and a high ratio of investment to GNP. But the deficiency of capital per man is gone, and so is the 11 percent ratio of investment to GNP that marked early postwar years.

Along any given desired path of capital per man, a world of full utilization would generate more investment demand by producing a more rapid growth of employment. But, according to the shorter-life variant of the Commerce estimates, a full-employment path could not add more than \$7 billion a year at present -- or 1 percent of the gross stock -- to the current rate of business capital outlays. These data point to \$57 billion as a liberal estimate of investment demand at full employment. The Commerce gross stock series which uses Bulletin F lives tells a somewhat more bullish story, but still points to an estimate below \$60 billion.

In conclusion, it is clear that we have not pinned down a number for investment demand at full employment. The bulk of the evidence suggests that we could not have generated \$64 billion of investment demand in 1962; even if we had begun at full employment, we could not have stayed there with existing policies. If the tax program now recommended by the Administration had been fully in effect in 1962, consumption demand at full employment would have been about \$7 billion higher, as a result of the extra disposable income permitted by the reduction in personal taxes. Accordingly, the amount of investment required to make demand match full employment output would have been about \$57 billion, rather than \$64 billion. The \$57 billion figure looks like a realistic target -- it would be hard to argue that it was decidedly too high or too low. Over the long-run, we may optimistically hope to do better than the implied 9.8 percent as our investment ratio at full employment. But, at this point, such a view is better supported by hope than by conviction.