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On Crotty's critique of q-theory

Neoclassical and other investment theories

Tobin's first inclination was to turn the other cheek, but he didn't like being called a conflationist—ugh! Yes, q-theory works best if managers act in the interests of the stockholders. Yes, q-theory is in that sense a neoclassical theory of corporate investment. But . . .

In the postwar discussion of the theory and econometrics of investment, "neoclassical" meant emphasis on profitabilities, relative prices, and cost-of-capital variables, in contrast to models that relied on output and sales and their "acceleration" or on liquidity flows and stocks. Sometimes these latter models were called Keynesian, because some early English followers of Keynes downplayed interest rate effects. But Keynes himself presented a neoclassical theory of investment, namely that it is carried to the point at which the marginal efficiency of capital is equal to the interest rate. His theory was essentially the same as that of the great neoclassical theorist Irving Fisher.

The heterodox element of Keynes' investment theory was his stress in Chapter 12 of the *General Theory* on the inevitable role of nonrational attitudes—optimism and confidence or their opposites—in forming estimates of the marginal efficiency. Even in insisting on the inapplicability of probability calculus to expectations of future investment returns, Keynes was not without mainstream precedents—his own *Treatise on Probability* and Frank Knight's distinction between risk and uncertainty.

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So when Dale Jorgenson called his cost-of-capital investment equation neoclassical, he was rebelling against the accelerationists and other “Keynesians” and not against Keynes. We proposed q-theory in the same spirit. We certainly did not thereby intend, any more than Keynes himself, to commit ourselves to a fully neoclassical macroeconomic theory.

Managers and stockholders

The first sentence of the Tobin–Brainard paragraph on which Crotty focuses criticism, a sentence omitted from the quotation on pp. 527–528, reads: “The neoclassical theory of corporate investment is based on the assumption that the management seeks to maximize the present net worth of the company, the market value of the outstanding common shares.” The rest of the paragraph spells out the implications of this assumption.¹

We were not asserting that the assumed identification of managers with stockholders’ interests is an empirical fact. For this reason among others, we made clear that we regard q-theory as a testable hypothesis, not as an incontrovertible truth or a tautology. There surely are divergences of interest between managers and owners. At the same time, we observe that corporate CEOs are very concerned (some would say obsessed) with the market value of their shares. Especially in these days of takeovers, they have to be. Consequently, one might expect financial markets to influence managerial decisions.

Our q-theory does *not* assume that stockholders and other market participants know better than managers what would increase the earnings and fundamental value of the firm in the long run. Speculators usually have short horizons and incomplete information.² Yet managers might

¹ The paper is by Tobin and Brainard, but the latter is spared in Crotty’s critique. The idea was first published in an earlier Brainard and Tobin paper, “Pitfalls in Financial Model Building,” *American Economic Review*, May 1968, 56, pp. 99–122. Crotty does not refer to this paper or to any of the several others we have published jointly or individually on the subject. And why does he capitalize the symbol Q?

² Crotty says that Tobin substitutes “well organized and efficient” markets for Keynes’ irrational “casino.” In the next sentence he refers to “Tobin’s stable and efficient financial markets.” This is a misunderstanding, indeed a misrepresentation. We did not use the word “stable.” Our word “efficient” referred only to technical market-clearing efficiency. We did not say or mean that stock markets come up continuously with fundamental valuations. In this 1977 article, which Crotty cites, and in others on “q,” we followed Keynes in believing that speculation makes market prices diverge from fundamental values. Again putting his own word in Tobin’s mouth, Crotty says in his footnote 9 that in his 1984 article, “Tobin appears to recant his belief in the valu-

make decisions they think the market will like and avoid those they fear the market will not like.

Nothing in our joint or individual writings on *q*-theory justifies Crotty's contention that "Tobin's manager and his financial investor . . . are equally knowledgeable and equally rational . . . [and] virtually indistinguishable. Nothing supports his statement that "within Tobin's conflation it is the shareholders who are behaviorally active . . . [and] management's only role is to execute decisions made for them in financial markets." We imagined that managers propose projects and securities markets appraise them.

Nothing excuses the charge that "Tobin places Keynes' stamp of approval on the rational expectations, efficient-markets general equilibrium models that are the modern extensions of the classical theory Keynes so vehemently opposed." No one who has read a sample of what Tobin has written in macroeconomics over many years could attribute to him, as Crotty does, a Panglossian view of the stability and efficiency of market capitalism, especially when it is unassisted by government policy.

Crotty believes that management, far from being myopic or selfish, aims intelligently at "the long-run reproduction, growth, and safety of the firm itself," resisting to the best of its ability the claims of uninformed and impatient stockholders as registered in financial markets or elsewhere. He associates Keynes with these characterizations, while criticizing Chapter 12 for assuming that managers supinely yield to these misguided pressures. Crotty exaggerates in both directions. Keynes says ". . . it is by no means always the case that speculation predominates over enterprise," and in section VII of the chapter he discusses the dependence of enterprise itself on "animal spirits" and "spontaneous optimism."

In the 1977 paper at issue we offered numerous reasons, with examples, why we would not expect *q*, particularly as measured in practice, to explain investment all by itself. Since *q* is necessarily calculated as the average financial-market value per dollar of replacement cost of the existing reproducible capital of a firm or an economy, it may often fail to provide a measure of the marginal value of investments in quite different kinds of capital. Crotty's case, p. 536, of qualitatively new investments by American firms whose market shares and average *q*'s

ation efficiency of financial markets." The term "valuation efficiency" does not appear in our 1977 article, and no other writing of ours, individual or joint, asserts such a belief. Tobin had nothing to recant.

were suffering from foreign competition could easily be interpreted as a marginal-average discrepancy, although Crotty cites it as a failure of q-theory and an example of managerial independence.

The macroeconomic setting of q-theory

The intellectual motivations for “q” were stated in the 1977 article. Since they will not be clear to a reader of Crotty, we will summarize them here. They mostly relate to the investment equations of short-run macro models.

First, following Abba Lerner (1940, p. 334), we thought that Keynes’ investment function (Chapter 11, pp. 136–137) suffered from a stock-flow confusion. Keynes’ condition that marginal efficiency of *capital* equal the rate of interest seemed not to determine a rate of net investment but a stock of capital. Indeed it is a condition for zero investment in a stationary economy. Investment should be modeled, we thought, as responding to the *difference* between the marginal efficiency and the interest rate. In this view we were in the tradition of Wicksell and of the Keynes of the *Treatise on Money* (who occasionally reappears in the *General Theory*, as in several sentences quoted by Crotty from Chapter 12). The q ratio is a convenient way of estimating that difference without requiring a separate measurement of the marginal efficiency of capital.

Second, we thought that rates of interest, nominal or real, on future obligations to pay money were not proper measures of the cost of capital for risky investment decisions. We need the discount rates “for streams of return with the characteristics of business capital” (Tobin and Brainard 1977, p. 245). These are implicit in stock market valuations, though not observable separately from expectations of future earnings. For example, many financial economists and pundits interpreted the low and even negative real interest rates of the stagflationary periods of the 1970s as indicative of easy monetary and credit conditions. But the low q’s of the same period signaled bad weather for investment. We think the central bank should keep its eye on q.

Third, it seemed to us common sense to find incentives for production of durable goods in the price of existing durable goods relative to the cost of reproducing them or their close substitutes. High prices for resale of houses or cars surely signal good opportunities for builders or automobile manufacturers. The q ratio applies that common sense idea to producers’ capital formation. But used capital goods markets are not reliable sources of values because of the specificities, complementarities, and ir-

reversibilities of most producers' structures and equipment. The stock and bond markets provide valuations of whole businesses.

Shadow price q and stock market q

The literature contains " q " models that are more strongly neoclassical than "Tobin's q ." To understand the difference, consider the question "How can the capital stock ever be different from the optimal stock, given prevailing prices, interest rates, and earnings expectations?" If stock adjustment, no matter how large, costs neither time nor resources, actual and desired stocks will always be equal. Arbitrage via real investment would keep q continuously at 1. Irreversibility and durability make an exception: q will be less than one for redundant capital, in which gross investment is zero. Tax considerations may provide another reason why the par value of q is not 1. With these amendments, investment will be just the first time derivative of the series for the desired capital stock, leaving no room for a separate theory of investment. In fact, Jorgenson got his "investment" function only by postulating a distributed lag between demands for new capital goods and their delivery.

We cited the resource costs of adjustment to explain why capital stocks do not jump instantaneously in response to changes in marginal efficiencies and interest rates. Rapid exploitations of investment opportunities are expensive.³ We did not introduce such costs into a firm's formal dynamic optimization problem. This has been done by other writers (Hayashi, 1982). The shadow price of investment at any time is a q -like variable, the value to the firm of the future returns to a dollar's purchase of capital goods that makes just worthwhile the current rate of investment. This value will not necessarily be one or any other constant; it will be high when it is optimal for the firm to invest rapidly and incur high adjustment costs, low when it is optimal to invest little and economize on adjustment costs.

The logic here is similar to that of the neoclassical theory of the corporation as we stated it in the paragraph quoted by Crotty. But note that this formal q -theory does not require any stock market. This " q " is not an observed or observable market price but an implicit shadow price.

³ This is an old idea, of course. Abba Lerner emphasized short-run increasing marginal costs in the capital goods industries. Robert Eisner and Robert Strotz, "Determinants of Business Investment," *Impacts of Monetary Policy*, The Commission on Money and Credit (Englewood Cliffs, NJ: Prentice Hall, 1964, pp. 60-337), stressed the firm-specific internal costs of absorbing changes in scale or technique.

It is not an incentive for investment; rather it is determined jointly along with optimal investment. They are both functions of the data of the optimization problem, including the technologies of production and adjustment, expected prices, interest rates, and taxes.

Empirically, it is quite obvious that stock market q 's and formal implicit q 's are not the same animals. Variations in marginal costs of adjusting capital stocks by investment would have to be implausibly large to be consistent with fluctuations in market valuations. Like Keynes, we believe that the stock market does not grind out values by mirroring the rational optimizations of informed managements but generates values of its own. These, we think, nevertheless provide incentives or disincentives for investment. We are so far from being thorough-going neoclassicals that we are quite comfortable in believing that corporate managers and other economic agents respond to market noise and are in any case sluggish in responding to the arbitrage opportunities of large deviations of " q " from par.

Concluding remarks

In the end Crotty does not disagree with us as much as he seems to think. The theme of his paper, according to its introduction, is that, contrary to most theories of macroeconomic instability, impediments to equilibrium may be rooted in either real or financial sectors, or in both. That is certainly our macroeconomics, and the only puzzle is why Crotty has created a fictional Tobin who thinks otherwise. In our macroeconomic models, both real and financial shocks affect q , indeed a shock to the marginal efficiency of capital cannot be classified as exclusively real or exclusively financial. It has both real and monetary consequences. Note that q itself is not a nominal or financial variable but a hybrid, the ratio of a financial market price to a commodity market price.

There are other points of agreement. Tobin has always emphasized the contrast between the liquidity of financial securities and the illiquidity of the underlying real assets. We agree with Crotty that neither managements nor stockholders dominate the other. We agree that q 's are partly endogenous variables, that investments can influence q 's as well as vice versa, and that the lags between exogenous changes in q and investment could be "long and variable."

Crotty, after describing scenarios in which investment fluctuations affect financial markets, says "On the other hand, a relatively autonomous rise in financial market optimism or decrease in investor risk

aversion can lower the cost of capital and improve the mood of management and thereby stimulate investment" (p. 537). So says q -theory.

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