NBER WORKING PAPER SERIES

KEYNESIAN, NEW KEYNESIAN, AND NEW CLASSICAL ECONOMICS

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Working Paper No. 2160

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
February 1987

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ABSTRACT

Much of the new theory of macro-economics that has been built upon micro-economic models of imperfect information leads to conclusions which are surprisingly close in spirit to Keynes' original analysis. This paper summarizes the macro-economic implications of information-based models of efficiency wages, credit-rationing and the breakdown of financial markets for equity-type securities. It shows how these models lead to behavior by firms and interactions among economic agents that account for many of the phenomena identified by Keynes in qualitative terms which were largely lost in subsequent formalizations of the Keynesian model. These imperfect information macro-models provide consistent theoretical explanations in the Keynesian spirit in unemployment, investment concentrated business cycles, rigid prices and the effectiveness of monetary and fiscal policy interventions. In doing so, they reconcile macro and micro-economic analysis in a way that has so far been achieved neither by the traditional Keynesians, who assumed away the micro-dimension of the problem, nor by the new classical economists who assumed away the macro-dimension of the problem.

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Keynesian, New Keynesian, and New Classical Economics

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For more than two centuries, there have been two opposing views of the capitalist economy. One, which usually attributes its origins to Adam Smith, emphasizes the efficiency of the market economy, the ability of the price system to transmit vital information from producers to consumers, and vice versa, and to coordinate allocation decisions, in a manner far beyond the capacity of any central planner. The other has focused its concern on the shortcomings of capitalism, particularly on the periodic episodes of massive unemployment of capital and labor. Surely, adherents of this view claim, these cannot be the manifestations of an efficient economic system.

To the classical believers of the efficiency of market economies, these episodes were viewed as disequilibrium situations, temporary aberations of an otherwise efficient economy; market forces, if left to themselves, would quickly restore equilibrium. Their modern day descendants, the New Classical Economists, have gone one step further: they deny the very existence of a problem; the massive changes in employment levels may best be interpreted, in their view, as a rational response to changing relative prices (workers chose to take more

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[1]Financial support from the National Science Foundation and the Hoover Institution is gratefully acknowledged. Comments of B. are gratefully acknolwedged.

leisure in 1932, because of the low relative wage). The unemployment of capital was no more serious than the fact that the spare tire of a car is, for the most part, unused: the extra capacity is held for those few times when it is really needed.

To Keynes' and his modern day followers, these views are not just absurd: they make a mockery of the "scientific method" which their adherents claim to follow. Worse still, they are irresponsible: to the extent that governments follow the non-interventionist policies often advocated, they not only condemn those individuals who cannot obtain gainful employment to the economic deprivation which results, but they also condemn the society which condones this unemployment to a host of social and economic consequences which follow from that unemployment.

One of Keynes' great contributions was, in effect, a reconciliation of the two opposing views of capitalism: rather than denying either the existence of the unemployment problem or its importance, he confronted it head on, argued that limited government intervention could correct this malady, and with this one malady corrected, the economy would once again operate in an efficient manner: the classical view would then be restored. Samuelson dubbed this, the Neo-classical synthesis.

The very reasons for the success of Keynes' approach provided the basis for the eventual disillusionment which set in

so strongly, at least in the United States, over the past two decades. Keynes had attempted to retain as much of the classical (neo-classical) apparatus as he could; the standard model was changed in minimal ways, with dramatic consequences. The neo-classical synthesis, as attractive ideologically as it was for those who believed in the market system, yet were disturbed by massive unemployment, was taken as an article of faith, not derived from any general theoretical structure: the fundamental question of why the failures of the market economy should only occur in the massive doses we associate with its periodic recessions and depressions was never asked, let alone answered. Was it not more plausible that the Great Depression was but the worse manifestation of a set of inefficiencies which, while pervasive, were far harder to detect or prove?

The schizophrenia to which Keynesian economics gave rise was reflected in the way that economics was taught: micro-economic courses, in which students were introduced to Adam Smith's invisible hand and the fundamental theorems of welfare economics, were followed by macro-economic courses, focusing on the failures of the market economy and the role of the government in correcting them. Two sub-disciplines developed, with micro-economists looking down upon the (lack of) rigor of the macro-economists, and denigrating the lack of theoretical foundations, while macro-economists castigated micro-economists for the obvious inappropriateness of their theories.

Dissatisfaction with Keynesian economics was based not only on this schizophrenia, but also on the lack of justification for some of the central assumptions, e.g. wage and price rigidities. Wages and prices were not rigid. If they did not fall enough, why didn't they? Why didn't firms who wanted to sell more simply lower their prices? A quarter of a century of research failed to provide convincing answers to these questions.[2] This state of affairs could not continue for long. An attempt at a reconciliation between the two seemed inevitable.

There were, broadly speaking, two ways by which the alternative approaches could be reconciled: to adapt macro-theory to micro-theory, or the converse. The New Classical Economics took the first approach. It argued that what was wrong with macro-economics was its absence of rigorous micro-foundations. Its advocates set out on an ambitious research program, entailing deriving the dynamic, aggregative behavior of the economy from the basic principles of rational, maximizing

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[2] These were not the only objections to Keynesian theory, the only sources of dissatisfaction. Historically, the inability to cope with the simultaneous outbreak of inflation and unemployment in the early seventies may have played as critical a role as the more theoretical problems with which we have been concerned here. The growth of monetarism during this period may, similarly, be more due to its ability to provide simple and clear prescriptions, than to its ability to remedy the theoretical deficiencies in Keynesian analysis.

Theorists were concerned, of course, not only by its incompleteness and its inconsistency with traditional micro-economic analysis, but also by its internal inconsistencies, e.g. its inconsistent expectational assumptions.

firms and individuals. The School recognized the importance of dynamics for understanding macro-behavior, and it recognized the central role of expectations in determining dynamic behavior. It focused its attention, then, on the consequences of rational expectations formation, and it is this aspect of their work which has given the School its alternative name.

The name, "Rational Expectations" school is, however, misleading: the central doctrines of the approach derive not from its belief in rational expectations, however plausible or implausible that assumption might be; but rather from its old classical assumptions of market clearing. And with those assumptions, the conclusion that there is no unemployment, and the irrelevance of government macro-policy,[3] follow as trivial consequences. These conclusions, it should be noted, would follow were participants in the market far less rational than postulated by the theory.

The other approach sees unemployment, credit rationing, business cycles as real economic problems, phenomena which cannot be reconciled with the standard micro-theory, and therefore seeks

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[3] Indeed, Neary and Stiglitz (1983) have shown that with rational expectations and price rigidities, government policy is even more effective than with myopic expectations: multipliers are even larger. In the New Classical models, macro-policy is irrelevant because it is unneeded. Even with full employment assumed, government policies will, in general, have real effects, e.g., on capital accumulation. See Stiglitz (1981, 1983).

as its objective the development of a micro-theory which can explain these phenomena. For want of a better term, I shall refer to this as the New Keynesian Economics. Work in this area has centered on understanding the consequences of imperfect information and incomplete markets, both for micro-economics and for macro-economics. Like the New Classical Economics, it seeks a single theory, but unlike the New Classical Economics, it seeks to explain unemployment, rather than to deny its existence. And unemployment is shown to be just one manifestation of a much wider set of market failures.

This paper attempts to present the broad outlines of the New Keynesian economics, and to show in what ways it is similar to traditional Keynesian economics, and in what ways it differs. Keynes had a vision of how the economy worked that was markedly different from that of the standard neo-classical theory. Decisions by firms were not based on rational calculations. Keynes used picturesque language to describe the behavior of entrepreneurs: they were moved by "animal spirits." But when Keynes came down to write a simple model, he resorted to more traditional modes of thinking, and these aspects were reinforced in the subsequent developments (e.g. by Hicks.) It is our contention that Keynes' problems arose from his inability to break away from his neo-classical training, that his vision, captured so well in many of his brilliantly written passages, provides greater insight into understanding unemployment and

business cycles than does the formal Keynesian model.

Some Key Keynesian Insights

There are four insights of Keynes that we think of as essential in constructing a model of unemployment and business fluctuations:

1. A general theory must explain the persistence of unemployment, as well as the cyclicity in certain key economic variables. To explain the persistent of unemployment, one has to develop a theory of the labor market. Keynes resorted, at this juncture, to the assumption of wage (real or nominal?) rigidities, an assumption which has been made the center of the fixed price school, but has been attacked by critics of Keynesian theory both on empirical grounds--wages, after all, fell by a third in the Great Depression, and countries facing inflation, with presumably some scope for changes in real wage, have faced unemployment just as countries in which wages and prices have fallen--and on theoretical grounds--no explanation for wage rigidities, other than ad hoc institutional considerations is provided.

What is required, however, for the Keynesian conclusions is not absolutely rigid wages, but only that wages do not fall to market clearing levels.[4] The recently developed efficiency wage

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[4] An alternative approach to that discussed here is that though wages fall, prices fall, and at approximately the same rate. Thus real wages do not fall. (This is the approach taken

theories[5] provide such an explanation. It is based on the hypothesis that there is imperfect information about the characteristics of workers; that the actions of workers cannot be monitored; and that it is not possible to write contracts that ensure that the worker bears all the consequences of his actions. As a result, the quality of the labor force, its productivity (and hence the firm's profits) may increase with the wage paid. Similarly, labor turnover may decrease with an increase in the wage, and since the firm must bear some part of the turnover costs, again profits may increase with an increase in wages, up to some point. In the face of unemployment, wages may not fall, for firms will recognize that if they lower wages, productivity will decrease, turnover may increase, and profits will fall. In this perspective, firms are competitive; there are many firms in

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by Solow-Stiglitz (1968)).

Though the falling wages and prices may give rise to an increase in the demand for consumer goods--the Pigou-Patinkin effect (in the absence of Barro-Ricardo considerations), there is little doubt that in the short run, in the length of time for which Keynesian analysis is appropriate, this effect is not of quantitative significance.

One should note that in many macro-economic models, real balance effects play a crucial, if slightly surreptitious, role. Thus, in the fixed price model, unemployment is attributed to too high a level of wages and prices; if wages and prices fell (keeping real wages, say, constant) employment would increase; but this is only because of an assumed important real balance effect. One should also note that in the short run, even if there were real balance effects of the kind noted by Pigou and Patinkin, these effects might be outweighed, in the short run, by dynamic, intertemporal substitution effects; if prices fall, and consumers come to believe that they will fall further, this may reduce their current demand for consumption. See Neary and Stiglitz (1983) or Grandmont.

[5] For a survey, see Stiglitz (1986a, 1986b).

the market; but nonetheless firms are wage setters, at least within a range. If the Walrasian wage, where the demand for labor equals the supply, is too low, any firm has the option of raising its wage and thus increasing its profits. The efficiency wage, the wage that maximizes the firm's profits, may of course vary with economic circumstances; hence the wage is not absolutely rigid. But wages need not fall to market clearing levels. [6]

An objection to this theory--as well as to standard Keynesian theory--is that the presence of wage rigidities in some sector(s) of the economy is not sufficient to explain unemployment.[7] So long as there is some sector with flexible wages, any individual who chooses not to work there is voluntarily unemployed. We view this to be largely a semantic objection: the fact is that individuals who are observationally indistinguishable from the unemployed individual are being employed at higher wages; that the market equilibrium is inefficient; and that resources which could be productively employed remain idle. (Elsewhere, (Greenwald-Stiglitz (1986b))

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[6] Thus, the policy implications of these theories may be markedly different from those of the standard fixed wage-price models. The latter assume that economic policy has no effect on the wages paid. The efficiency wage models recognize that certain policies (e.g. unemployment compensation) may have strong effects on equilibrium wages, and the consequences of this need to be taken into account.

[7] This is, of course, not the only objection to efficiency wage theory. For a more extended discussion, see Stiglitz (1986b).

we have discussed at length a variety of reasons why it may be rational for an individual not to accept a low wage currently, if he believes that a better paying job, will becoming available in the near future; these have to do with asymmetric information, with the information conveyed by the individual's willingness to accept a low wage job, as well as with the fact that once an individual is employed, he becomes "used labor" with adverse effects on future wages similar to those which arise in Akerlof's lemons model. We have also discussed the reasons why a worker might not be willing to accept a low wage from an employer, with a promise of a future higher wage if the firm survives, because to do so would, in effect, make the worker take an equity position in the firm; see below for a discussion of why individuals would not wish to do so.)

2. A macro-economic theory must not only explain the persistence of unemployment, but also its fluctuations. This is not as easy a task as it might seem. There are two problems.

First, what are the sources of shocks to the economy which give rise to such large perturbations in economic activity?[8] It is difficult to find shocks that are external to the economic system, though occasionally such shocks--such as wars and the

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[8]The problem is not that there are not shocks, but the magnitude of the shocks, and their correlations across sectors.

rise in oil prices[9] --do occur. And if there are not exogenous shocks, what are the internal mechanisms which lead to such variations in economic activity?[10] There is considerable evidence that much of the fluctuations are due to variations in the demand for investment, and in particular for inventories. But in theory, with concave production functions, with the shadow price of labor being low in recessions, with low real interest rates, there should be production smoothing: inventories should serve to dampen economic fluctuations; they should not serve to exacerbate them.[11]

Keynes was correct in stressing the importance of investment for understanding economic fluctuations. To explain fluctuations in investment, he had to rely on animal spirits, on unexplained changes in expectations. The expectational assumptions

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[9]But even this should be viewed as endogenous: no change in demand or supply occurred, though the formation of a cartel can be viewed, from this perspective, as an exogenous shock to the system.

[10]The belief that the capitalist economic system could not internally be flawed to the extent that it gave rise endogenously to fluctuations provides much of the motivation for the search for an external culprit, usually identified as the "government" or "monetary authorities."

[11]There are other stabilizers in the economy which we have not discussed. Savings serves to stabilize consumption.
In the absence of adequate savings, the insurance provided by implicit contracts serves to stabilize incomes, and thus to stabilize consumption. Thus, implicit contracts, rather than exacerbating business fluctuations, may actually serve to reduce them. (For a more extensive discussion of this paper, see Stiglitz (1986).)

underlying Keynes' analysis may be no worse than those underlying the rational expectations school. Yet, there is something disquieting about relying so completely on the inexplicable or the irrational for a theory of business cycles.[12]

The second problem in explaining fluctuations is the following: in the typical micro-economic model, changes in prices (interest rates, wages) serve to dampen any disturbance to demand or supply, just as we argued earlier that inventories should stabilize the economy. Thus even large exogenous changes (changes in demand curves or supply curves) may result in small changes in equilibrium values.

Keynes had to explain not only why the demand for investment

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[12]Old style macro-economists explained these investment fluctuations by reference to accelerators. These accelerator models implicitly were based on firms extrapolating current levels of output into the future; that is, they were based on irrational expectations. These models may be descriptively accurate, more descriptively accurate than the rational expectations models; the question which we have posed for ourselves is, however, can one explain the fluctuations in investment without recourse to such irrational expectations.

LaRoque has recently put forward a rather different explanation for inventory behavior. He postulates rational expectations, but non-market clearing. He argues the inventories are held for speculative purposes, and assumes that speculators have some priority over others in the event of an excess supply of goods. He shows then that this can give rise to inventory cycles. We suspect that if one looked carefully at shadow wages during recessionary periods, and asked whether, given those shadow wages, would it have paid firms to invest in inventories, were they store the goods until a period of high demand, taking into account market rates of interest, the answer would be yes, and indeed the profits from doing so would have exceeded the speculative profits accruing during periods in which inventories were actually accumulated.

curve shifted, but also why changes in the interest rate could not offset the direct effects. While his explanation of the source of the shift in the demand for investment may have been incomplete, his explanation for why interest rate changes could not offset these effects was unpersuasive.[13] In his theory, the reduction in the demand for investment should have lead to a fall in the real interest rate; yet during the recession real interest rates rose. And businessmen argued that interest rates had little effect on their investment decisions.

Similarly, he failed to provide an explanation for why wages did not change: he simply asserted that they did not.

The efficiency wage theory explains why wages may not fall to market clearing levels. A similar theory of the capital

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[13] The liquidity trap theory was designed to explain a floor on the nominal interest rate. But so long as money cannot be made to be negative-interest bearing, similar results would follow simply from the non-negativity of nominal interest. What is relevant for investment should, ostensibly, be the real interest rate. And the floor on nominal interest rates, combined with deflationary pressures of a recession, give rise to increases in real interest rate. But the price rigidities, which seem at the cornerstone of modern interpretations of Keynesian analysis, would imply a fall in real interest rates in a recession. As we have already noted, prices did fall, real interest rates did rise, but only to a limited extent.

In more recent recessions, however, prices have been rising, sometimes at a sufficient rate to make real interest rates negative (and after tax real interest rates very negative). These decreases in the real interest rate were not sufficient to restore investment. (This is not surprising; firms traditionally require twenty to thirty percent expected returns to undertake an investment project. A change in the real interest rate from 2% to 1% is little more than rounding error.) In the end, it is the interest inelasticity of investment which appears to be crucial; that is, no plausible changes in real interest rates suffice to restore investment. Below, we provide an explanation for this.

market shows why interest rates may not fall (See Stiglitz-Weiss, 1981,1983, 1985). More generally, Akerlof and Yellen have pointed out that even when firms should change the wages they pay they may not do so; they show that the loss of profits from this near-rational behavior may be small, even though the loss to society may be large. Indeed, if firms are risk averse (as we argue below they will be), and if there is some uncertainty about the consequences of wage changes, keeping wages unchanged in the face of certain disturbances is fully-rational. (Again, similar arguments hold for the capital market.)

Moreover, the efficiency wage models further show why the wages of firms are interdependent: the optimal wage for firm i depends on the wages paid by all other firms. This interdependence may lead to multiple equilibria, in which no firm changes its wage even in the face of changes in its demand.[14]

Thus, by explaining wage, interest rate, and price rigidities, these theories help to explain why certain disturbances are <u>multiplied</u> by the economic system rather than dampened.[15]

In the theory we present below, there is a further set of

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[14]Again similar arguments hold for the capital market and the product market. See, for instance, Stiglitz (1986c).

[15]Macro-economists, at least since Kahn's basic article, have emphasized the role of multipliers, without recognizing how inconsistent they are with standard micro-analysis. The critical difference between economies which amplify disturbances and those which dampen them seem to be price rigidities; our analyusis exxplains these rigidities, and by doing so, puts the multiplier on sound theoretical grounds.

reasons for the "multiplication" of disturbances. In the presence of incomplete markets and imperfect information, the actions of one firm or individual exert externality-like effects on others; the reduction of production by one firm, in response to increased uncertainty or a reduction in its working capital, increases the uncertainty and reduces the working capital of other firms. While price adjustments tend to dampen disturbances, externality effects may (and in these instances do) exacerbate them.[16]

3. Keynes was correct in stressing the importance of the dichotomy between savings and investment. In effect, he recognized that funds within the firm were different from funds in the household sector. Though he sensed the importance of this distinction, when he came to write down his model, he wrote down the standard neo-classical model, in which that distinction plays no role. The demand for investment was determined by the interest rate. There was, for instance, no credit rationing.

This was all the more surprising, given his (implicit, sometimes explicit) general recognition of the importance of capital market imperfections. Individuals' consumption was

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[16] There are other stabilizers in the economy which we have not discussed. Savings serves to stabilize consumption.

In the absence of adequate savings, the insurance provided by implicit contracts serves to stabilize incomes, and thus to stabilize consumption. Thus, implicit contracts, rather than exacerbating business fluctuations, may actually serve to reduce them. (For a more extensive discussion of this paper, see Stiglitz (1986).)

related to their current income, partly perhaps because current income was a good forecast of future income, but partly because of the lack of access to funds. This failure to recognize sufficiently the importance of capital market imperfections, and the consequences which follow from that, turns out to be his most important error.

4. Keynes needed, as we said, to find a source of fluctuations in economic activity. It was apparent that changes in technology, in supply, could not account for what was occurring in the Great Depression. He therefore naturally turned to changes in demand. Good economists brought up in the Marshallian tradition had been taught to separate out disturbances to a market into demand and supply disturbances.

Keynes was correct in focusing on demand disturbances, but his reliance on the Marshallian demand/supply framework posed problems which he, and his followers, never satisfactorily resolved. For the Marshallian theory suggested that equilibrium ought to be at the intersection of demand and supply; if firms were on their supply curve, real product wages should rise as employment falls. This was one of the first empirical propositions of Keynesian economics to fall by the way-side. But just as Marxian economics was never abandoned by its proponents, simply because its predictions turned out to be false, so too Keynesian economics was not to be abandoned simply because one of its important empirical predictions turned out to be wrong. As

always in economics, there are three ways of dealing with uncomfortable facts: (a) to deny them, e.g. by asserting that wages and prices are measured incorrectly (just as the New Classical economists approach the unemployment problem by denying the relevance of the unemployment statistics); (b) to provide a new interpretation, e.g. by asserting what is relevant is not the spot wage, because of the existence of long term (implicit contracts), ignoring the fact that real product wages of newly hired workers or workers on spot contracts also did not rise significantly; (c) to assert that the empirical proposition was not central to the theory. Thus, a large literature developed, asserting that firms, while solving quite complicated intertemporal maximization problems, acted as if the price and quantities they faced were fixed.[17] It was simply asserted that firms did not use price policy to affect sales, an implausible and counterfactual assumption.[18]

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[17]This literature dates back to the sixties, with contributions by Hansen (1951), Solow-Stiglitz (1967), and Barro-Grossman (1971). The subsequent fixed-price literature is enormous.

[18]Models which postulate imperfectly competitive firms explain why real wages may not equal the value of the marginal product; but they have little to say about involuntary unemployment or its fluctuations. (Indeed, in contrast to models with classical unemployment, with real wages in excess of the value of the marginal product, here real wages are less than the value of the marginal product; whether employment is higher or lower in equilibrium simply depends on the (uncompensated) labor supply elasticities.) Below, we provide an explanation for cyclical variability in mark-ups. See also Stiglitz (1984).

The New Keynesian Economics

The New Keynesian Economics begins with Keynes' basic insights, but recognizes Keynes' excessive dependence on a neoclassical framework, and his failure to fully recognize the consequences of capital market imperfections, imperfections which can be explained in terms of the costs of information.

The major ingredients of this new perspective are the following:

1. The efficiency wage model, which explains why wages, while not rigid, do not fall to market clearing levels (see above).

2. Capital market imperfections, derived from imperfect information. There are asymmetries of information between managers of firms and potential investors, asymmetries which can give rise to what we shall call "equity rationing." Equity rationing is important because it implies that if firms wish to obtain more capital, to invest or to increase production, they must borrow the funds; and even if they are able to do so, they must expose themselves to considerable risk, including the risk of bankruptcy, i.e. the risk of not being able to pay back the promised amounts.

The consequences of this are exacerbated by the absence of

futures markets.[19] Thus, firms cannot sell the goods which they plan to produce until after they have produced them.[20] Every production decision is a risk decision, a risk which they (the managers and equity holders) must bear, and which they cannot easily shift on to others. The absence of futures markets implies that firms cannot sell their output at the time of production.

Thus, an analysis of firm behavior must focus on its willingness to undertake these risks. Unexpected changes in its working capital base (caused for instance by unexpected changes in the prices at which it can sell its goods) could, for instance, have a deleterious effect on its willingness to produce.

3. While at times this limits the amount that firms are willing to produce, at other times, firms' access to capital is limited;

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[19] Keynes did not explicitly comment on this, perhaps because to him the absence was so obvious not to require comment. To those brought up in the Arrow-Debrue framework, it has become a ritual to attempt to identify in what ways the proposed model differs from that paradigm.

[20] There are, of course, industries in which goods are produced only on order. This is particularly true of some investment goods manufacturing industries. Then, variations in the level of production must be traced back to variations in the demands which they face; and these are related to the willingness of other producers to invest (produce.) Thus, the supply responses of some firms are reflected in demands facing other firms. This is another reason why the simple Keynesian dichotomy into demand or supply disturbances may be somewhat misleading.

there is credit rationing. The reasons that suppliers of capital do not raise interest rates in the presence of an excess demand for capital are analogous to the reasons that firms do not lower wages in the presence of an excess supply of labor: increasing interest rates may lower the expected return to the supplier of capital, either because of selection effects (the mix of applicants changes adversely) or because of incentive effects (borrowers are induced to undertake riskier actions.)

4. Monetary policy exerts its influence--when it does--not so much through the willingness of individuals to hold cash balances, but through the availability of credit. Asymmetries of information imply that if banks decide to lend less, there are not other potential lenders who are perfect substitutes. Banks' decisions to lend are analogous to those determining firms' willingness to produce. The monetary authorities can take actions which affect banks' willingness to lend (or the terms under which they are willing to lend.) Though, depending on the economic circumstances, other lenders may take partially offsetting actions, their actions can never be fully offsetting.

The New Keynesian Economics provides a general theory of the economy, derived from micro-economic principles (and thus integrates the two sub-disciplines.) It succeeds both in filling the lacunae in traditional Keynesian theory (e.g. by explaining partial wage rigidities, rather than simply assuming rigid wages) and resolving the paradoxes and inconsistencies of more

traditional Keynesian theory (both the internal inconsistencies, e.g. concerning how expectations are formed, and the inconsistencies between its predictions and observations.) It provides an explanation both for an equilibrium level of unemployment (through the efficiency wage theories) and for business fluctuations.[21] The theory of business fluctuations it provides is simple: in broad outline, certain shocks to the economy affect the stock of working capital of firms. Even if firms had perfect access to the credit markets (that is, they could borrow as much as they wished, at the actuarially fair interest rate), the amount they would be willing to borrow is limited by their willingness to bear risk; the fixed commitments associated with loan contracts imply that, as the working capital which is available is reduced, the risk (bankruptcy probability) associated with any level of borrowing increases. Thus, if their working capital is reduced, their desired production level (given that they do not have fixed commitments to sell their products[22]) is reduced; and it takes a number of periods before the levels of

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[21] This is not to say that there are not important gaps in the theory which remain. The theory developed so far does not provide an entirely endogenous business cyle; it only explains how the economy responds to certain shocks.

There remains a controversy over whether an entirely endogenous business cycle theory is required, or whether one should be content with a theory which translates certain kinds of shocks into disturbances in which the economy persists below "full employment" for a number of periods. We do not take a position on that issue here.

[22] Even if they have commitments, potential purchasers may not honor those commitments, particularly in the event of their bankruptcy. In recessions, the risk associated with any "commitment" is increased.

working capital are restored to normal. The theory provides an explanation not only for why aggregate shocks (like an unexpected decrease in the price level, resulting from a monetary shock) have an aggregative effect on the economy, but also why sectoral shocks (like an unexpected shift in demand, or the unexpected formation of an oil cartel) would have aggregative effects: willingness to produce will, in general, be a concave function of working capital, and hence a redistribution of working capital will have aggregative effects.[23]

In the discussion below, we shall show how this theory provides an explanation for several of the phenomena which seemed so hard for more traditional Keynesian theory to explain: (a) it explains why firms do not lower prices in recessions, i.e. it explains cyclical movements in mark-ups; (b) it provides an explanation of cyclical behavior of investment and inventories; (c) it provides an explanation for why unemployed workers do not succeed in getting hired by offering to work for lower wages, and even in industries where efficiency wage considerations are not important, it provides a partial explanation for why workers do

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[23]These redistribution effects seem to be more important than the redistribution effects, e.g. sometimes postulated with government debt policy (the change in the maturity structure of the debt having either an intertemporal or an intratemporal redistribution effect) or with some forms of insurance.

The redistribution resulting from insurance associated with implicit labor contracts, a redistribution from the corporate to the household sector, operates essentially through the mechanism described above. In the presence of perfect capital markets, the only effects arising from that redistribution would be those associated with differing marginal propensities to consume between capitalists and workers.

not offer to work for lower wages, in return for the promise of higher wages in the future; and (d) it provides an explanation for why an unanticipated wage-price reduction might actually serve to exacerbate the recession, rather than alleviate it (by further deteriorating the working capital base of firms).

Keynes' Errors

We have argued that Keynes' basic error was an excessive reliance, in his formal modelling, on the neo-classical/Marshallian tools which then, as now, were the style of the day. The verbal stories which accompany the model captured far more of his insights into what was going on.[24] It may be useful at this juncture to review what are, in our perspective, his fundamental errors, and to suggest how our theory corrects these errors. His most important errors lie, in our judgment, in his theory of the firm and in his explanation of the role of money in determining the level of economic activity. Both of these can be related to his failure to understand fully the nature of capital markets.

1. Keynes failed to recognize the importance of the distinction between long term bonds and equities. He lumped the two together as long term assets. Even in the absence of bankruptcy, the two differ in their risk properties, with bonds rising in value in recessions, equities falling. The two securities are thus complements, rather than substitutes, in individual's portfolios. For our purposes, however, this distinction is not as important as the differences in the nature of the firms' commitment: with bonds and loans, the firm is committed to paying back a certain

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[24] He should not be judged too harshly: as we have said, presumably he wished to make his ideas as palatable as he could to his contemporaries, and to do this, he had to show that by altering only a few of the basic assumptions of the standard model, one could obtain dramatically different results.

amount on a particular date; with equities, no such commitment exists. As a result, for firms as well as investors, these two securities are far from perfect substitutes. Particularly in recessionary periods, firms seldom resort to the equity market to raise needed capital: investors suspect that any firm wishing to do so is in bad straits, unable to obtain capital from banks or other sources. Elsewhere, we (Greenwald, Stiglitz, and Weiss (1984)) have provided a simple adverse selection model (again, a variant of the standard adverse selection model) showing that only the worse firms will in fact resort to the equity market to raise capital.

2. Keynes' attempt to explain economic fluctuations in terms of demand considerations alone not only posed the quandry we have referred to before--why don't firms use price policy to increase their sales--but posed another problem: how could a small open economy ever face Keynesian unemployment problems? Simply by changing its exchange rate, it could face unlimited demand for its products.

In our theory, there is not a clean distinction between demand and supply. Firms would be willing to produce more, if they could have an assured demand. In this sense, demand is limiting production. Firms are not willing to produce more, given the risks associated with production in the absence of an assured demand. In this sense, firms are on their supply curve.

Our theory thus explains why the amount of goods firms are willing to supply at any expected real product wage may change over the business cycle.

Our theory can also explain why firms, in setting their prices, might attempt to have a higher mark-up over costs in recessionary periods. In markets with imperfect competition and imperfect information, firms must recruit customers. They do so partially by using price policies. They thus face a trade-off, lower prices today leading to higher future sales, higher future profits, but lower current profits. The price they choose depends on the implicit cost of capital (not the market rate of interest), and in the presence of equity rationing, this may be higher in recessionary periods.

3. Keynes argued that the primary determinant of the level of investment, given a set of expectations, was the interest rate. Though there has always been some ambiguity about whether this is the real or nominal interest rate, the only sense that modern day economists can make of this is that it must have been the real interest rate. But real market interest rates have fluctuated relatively little (until the 80s). A good theory should never take a constant (or an almost constant) as an explanatory variable.

In our theory, credit availability at certain times is the major determinant of the level of investment. It is precisely at those times that monetary policy can affect the level of economic activity.

In recessionary periods, however, banks may be willing to lend to any "good" prospect at the going interest rate, but there is a shortage of willing borrowers. In such circumstances, monetary policy is likely to be ineffective.

The Keynesian-neoclassical theory simply cannot explain inventory fluctuations, the fact that inventories serve to exacerbate rather than to dampen fluctuations. Our theory can. Again, the increase in the effective cost of capital--the result of equity rationing and the decrease in the supply of working capital--implies that firms will wish to decrease their inventories in recessionary periods.

4. The mechanism by which the monetary authorities affected the level of economic activity in Keynesian analysis is implausible. There are three steps: (a) the government takes actions which affect the money supply; (b) given individuals' demand functions for money (a function presumably of interest rates and income), interest rates change; (c) as a result of interest rate changes, investment changes.[25]

There are problems with each of the steps: while the

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[25]This is obviously an oversimplification. In some variants of the theory, the demand for money depends only on income, and hence, given rigid prices, a decrease in the supply of money must be accompanied by a decrease in income. No plausible mechanisms by which this is effected have been put forward.

In other theories, the demand for investment is a function of expected future incomes, which in turn are a function of current income. The fluctuations in investment then become as much a consequence as a cause of income fluctuations. It is hard to reconcile such naive accelerator models with rational behavior.

government may be able to affect the supply of outside money, there are close near money substitutes, at least for transactions purposes. Moreover, money is not required for most transactions, only credit. (This is what makes those models which are based on the cash-in-advance constraint so implausible.) And to the extent that money is required for transactions purposes, one must explain why that is so. Moreover, the relationship between transactions and income is tenuous: many, perhaps most, transactions are exchanges of assets, and the kinds of economic changes associated with the business cycle are often accompanied by changes in wealth, and hence in asset distribution.

To the extent that money demand is based on asset considerations, what is relevant, of course, is not income, but wealth. And since there are short term bonds which are, except for transactions purposes, perfect substitutes for money, the relevant opportunity cost of holding money is the short term money rate of interest; but if any interest rate is relevant for investment, it should be the real rate of interest.[26] Moreover, as the recent development of Cash Management Accounts makes clear, it is clearly feasible to provide interest bearing "money," in which case the only relevant question facing the

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[26]It is not clear whether it should be the long term or short term real interest rate. When the question is, when should a project be undertaken, the short term real interest rate is presumably relevant; when the question is, should a project be undertaken, it is presumably the long term real interest rate. Since the information relevant to undertaking a project (the set of suppliers, the prices at which factors can be purchased, etc.) becomes obsolete so rapidly, in many cases at least the question posed by firms is more the latter than the former.

individual is the maturity structure of the debt which he wishes to hold.

More recent Keynesians (e.g. Tobin) have proposed another mechanism by which monetary policy affects economic activity: In the general portfolio approach, different assets (short term, long term bonds) are seen as imperfect substitutes, and changes in the relative supply affect different interest rates, and, in particular, the price of equities. This can be criticized are several grounds. First, firms do not, for the most part, resort to the equities market to raise capital. Thus the price of equities is not directly relevant. How can we explain the observed correlations? In our theory, optimistic expectations, say about future sales, will be reflected in a high price of equities (high future profits), and in managers' willingness to produce. There is a correlation, but not causation.

To put it another way, what managers and controlling stockholders are concerned about is not the price of equities today, but the price of equities when they go to sell their shares. The current price may be a good forecast of future prices, but businessmen are more likely to base their judgments concerning particular investment projects not on the judgments of some relatively uninformed outsider, but on their better informed insider views.

Secondly, in theory, changes in the maturity structure of the government's debt should have no effect on the market equilibrium, provided that there are not significant

redistributive consequences of that change (and these seem implausible.) For those changes represent changes in the (stochastic) future tax liabilities of individuals. Individuals, in deciding on their optimal portfolios, should take into account other aspects of the risks which they face, including wage and tax risks; and if they do this correctly, there will be no effects on real interest rates. The Tobin approach would, in a perfect capital market, seem to rely on irrational behavior. (See Stiglitz 1981)

Tobin might object to this on two grounds: first, that individuals do not really include their stochastic tax liabilities in their portfolio analysis; and secondly, that our analysis assumed a perfect capital market. We are inclined to agree[27]; as a result, we also agree that the government can change market rates of interest. But we remain unconvinced that this is (an important) mechanism by which the government controls economic activity. Rather, we would argue that government monetary policy affects bank's willingness to lend (and the terms on which they are willing to lend), and it is through this

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[27]This is not to say that individuals do not take some account of their future tax liabilities; but what evidence there is not does support the hypothesis that they take these future tax liabilities "fully" into account.

We have not indicated all of the relevant assumptions in the "Irrelevance Theorems," only what we view to be the most important. Thus, for instance, the irrelevance theorems assume that taxation is non-distortionary. But taxes are distortionary. Reducing taxes today and increasing taxes in the future may have a real welfare effect; but it seems implausible that the differences in these Harberger distortionary triangles, each of themselves being small, can account for monetary policy having any signficant effect.

mechanism that investment may be affected.

Concluding Remarks

On methodology. Capitalist economies are complicated. A model is supposed to capture their central features, not reproduce them exactly. Decisions of individuals and firms today are based on future expectations, and are affected by past decisions. Individuals do not have perfect foresight or rational expectations concerning the future. The events which they confront often appear to be unique, and there is no way that they can form a statistical model predicting the probability distribution of outcomes. And there is little evidence that they even attempt to do so. At the same time, individuals are not myopic. They do not simply assume that the future is like the present.

Markets are not perfect. But markets do exist. Prices do adjust. Wages fall in the presence of massive unemployment.

These "facts" pose some important strategic decisions for the modeler: within the foreseeable future, it is not possible to construct a dynamic model adequately reflecting all of them. Polar cases are easier to study. Should one assume perfect wage or price flexibility or no wage or price flexibility? Rational expectations or myopia? Any set of choices is open to criticism, but equally, can be defended as part of a long term research strategy.

In our view, the choices must be dictated by the phenomenon to be studied. The central problem we are interested in is explaining unemployment. Thus, to begin the analysis by assuming

market clearing is to assume away what is to be explained.

While we agree about the importance of understanding the dynamic maximization problems individual and firms are engaged in, ignoring the important constraints they face (e.g. on the access to capital markets) results in models which are of little relevance. We suspect that in many instances, myopic models focusing on the constraints are far better than "rational" models ignoring them. Indeed, in some cases, one can show that the rational models with constraints look identical to the standard myopic models (e.g. with rule driven behavior, all of profits and none of wages saved.)[28]

2. On policy. There has been a long standing controversy over what governments should do in the face of unemployment: (a) nothing; (b) encourage wage reductions; (c) use monetary policy; or (d) increase government expenditures. The success of

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[28]The rational expectations school is often credited with the observation that government policies, if anticipated, will have affects quite different from those intended. This seems to be giving them more credit than is due. In the 60's, during the period in which dynamic models were being so actively investigated, there was a considerable amount of work analyzing perfect foresight models; included in these analyses was the analysis of the consequences of fully anticipated government actions. It was noted, for instance, that a temporary investment tax credit would decrease investment prior to its effective date, cause a surge of investment subsequently, cause another surge in investment prior to its removal, and lead to depressed investment immediately after its removal.

The contribution of the rational expectations analyses was to investigate these questions in a stochastic environment. While this was an important extension of the non-stochastic perfect foresight models, the basic insights--at least the one noted above--remain the same.

Keynesian theory has much to do with the fact that it provided a theoretical justification for those who wished to take the fourth course. The success of the New Classical theory has much to do with the fact that it has provided a theoretical justification for those who wished the government to do nothing.

In our view, Keynes' analysis was basically correct. Government policy can affect the outcome; in recessionary periods, monetary policy is likely to be of limited efficacy;[29] and wage cuts may not be effective.

3. On the efficiency of the market economy. We agree with Keynes that unemployment is a real problem facing capitalist economies. Though a half-century of experience may make us less sanguine about the government's ability to eliminate business fluctuations, a half-century of experience with alternative forms of economic organization have made us even less sanguine about

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[29] In Keynesian theory, wage cuts reduce aggregate demand. In more modern Keynesian theory, where consumption is based on permanent income, such wage cuts might have a negligible effect on demand. Our theory provides an explanation of why wage cuts could have a significant effect: imperfect capital markets result in some individuals having to reduce their consumption.

On the other hand, there are circumstances in our theory where a wage cut would be effective: when each firm chooses not to reduce its wage, given the wages paid by other firms, a coordinated wage change can increase the demand for labor.

Our theory suggests, however, that there are other circumstances where lowering real wages (below the efficiency wage) would actually result in a reduction in the demand for labor.

To the extent that lower wages lead to lower prices, wage reductions can have future deleterious effects, in reducing the working capital available to firms, and in making them more reluctant to produce, if they extrapolate current declines in prices to continue in the future.

the ability of these alternatives to provide the basis of a more efficient system of resource allocation. Like the emperor's new clothes, we may not be able to see the invisible hand because it is not there; or perhaps more accurately, because it is so invisible, we do not see how palsied it is. Unemployment is but the worse manifestation of pervasive market failures which arise in the presence of imperfect information and incomplete markets. But if the invisible hand of the market is palsied, the visible hand of the government may be far worse. Voltairewas wrong: we do not live in the best of all possible worlds. We live in an imperfect world. And we must learn to live with those imperfections. Limited government intervention--correcting the worse manifestations of market failures, including massive unemployment--may, after all, improve the efficiency of market economics. In the end, Keynes, and Keynesian policies, are vindicated.

References

Akerlof, G. [1970], "The Market for Lemons: Qualitative Uncertainty and the Market Mechanism," Quarterly Journal of Economics, Vol. 84, pp. 288-300.

Akerlof, G. and J. Yellen, "A Near Rational Model of the Business Cycle with Wage and price Inertia," Quarterly Journal of Economics, 1985, pp. 832-38.

Barro, R. J., and Grossman, H. I. (1971). A general disequilibrium model of income and employment. American Economic Review 61:82-93.

Blinder, A. and J. E. Stiglitz. "Money, Credit Constraints and Economic Activity," American Economic Review, May 1983, pp. 297-302.

Greenwald, B. [1979]. Adverse Selection in the Labor Market, New York, Garland Press.

Greenwald, B. and J. E. Stiglitz. Externalities in Economies with Imperfect Information and Incomplete Markets, Quarterly Journal of Economics, May 1986.

Greenwald, B., Stiglitz, J.E. [1986], "Information, Finance Constraints and Business Fluctuations," Proceedings of the Taiwan

Conference on Monetary Theory, Taipei, Chung-Hua Institute.

Greenwald, B. and J. E. Stiglitz. "Money, Imperfect Information, and Economic Fluctuations," paper presented at Conference on Monetary Theory in Taipei, January, 1986, and to published in Proceedings (Oxford University Press).

Greenwald, B., Stiglitz, J.E. and Weiss, A. M. [1984], "Informational Imperfections and Macroeconomic Fluctuations," American Economic Review, Papers and Proceedings, Vol. 74, pp. 194-99.

Hansen, B. (1951). A study in the theory of inflation. Allen and Unwin, London.

Kalecki, M. [1939], Essays in the Theory of Economic Fluctuations, New York, Russell and Russell.

Myers, S. C. and Majluf, N. S. [1984], "Corporate Financing and Investment Decisions When Firms Have Information that Investors Do Not," Journal of Financial Economics, Vol. 11, pp. 187-221.

Neary, P., and J. E. Stiglitz. "Towards a Reconstruction of Keynesian Economics: Expectations and Constrained Equilibria," Quarterly Journal of Economics, Supplement 1983, pp. 199-228 (presented at the Athens meeting of the Econometric Society,

September 1979).

Phelps, E. S. and Winter, S. G. [1970], "Optimal Price Policy Under Atomistic Competition" in E. S. Phelps, ed., Microeconomic Foundations of Employment and Inflation Theory, New York. W. W. Norton and Co.

Solow, R., and J. E. Stiglitz. "Output, Employment and Wages in the Short Run," Quarterly Journal of Economics, Vol. XLXXXII, November 1968, pp. 537-560.

Stiglitz, J. E. (1986b) "The Causes and Consequences of the Dependence of Quality on Price," Hoover, mimeo.

J. E. Stiglitz (1986a), "Theories of Wage Rigidities," paper presented at a conference on Keynes' Economic Legacy, University of Delaware, December 1983, in Keynes' Economic Legacy, Preager Publishers, 1986.

Stiglitz, J. E. [1985], "Credit Markets and the Control of Capital," Journal of Money, Credit and Banking, Vol. 17, pp. 133-152.

J. E. Stiglitz, "Price Rigidities and Market Structure," American Economic Review, Vol. 74, No. 2, May 1984, pp. 350-56 (paper presented to the American Economic Association, December 1983).

J. E. Stiglitz (1983), "Competition and the Number of Firms in a Market: Are Duopolies More Competitive than Atomistic Markets?", forthcoming in Journal of Political Economy.

J. E. Stiglitz (1983), "On the Relevance of Irrelevance of Public Financial Policy: Indexation, Price Rigidities and Optimal Monetary Policy," paper presented to a Conference at Rio de Janeiro, December 1981, published in proceedings, Inflation, Debt and Indexation, R. Dornbusch and M. Simonsen, eds., M.I.T. Press, 1983), pp. 183-222.

Stiglitz, J. E. (1981) "The Relevance or Irrelevance of Government Financial Policies," NBER working paper (forthcoming in M. Boskin, ed. Proceedings of IEA Roundtable on Budget Deficits).

J. E. Stiglitz and A. Weiss, "Credit Rationing and Collateral," paper presented at a conference sponsored by CEPR, Oxford, September, 1985.

Stiglitz, Joseph and A. Weiss. "Incentive Effects of Terminations: Applications to the Credit and Labor Markets," American Economic Review, 73, (1983): 912-927.

Stiglitz, J. E. and Weiss, A. [1981], "Credit Rationing in

Markets with Imperfect Information," American Economic Review, Vol. 71, pp. 393-410.