"Liquidation" Cycles and the Great Depression*

J. Bradford De Long
Harvard University and NBER

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The Federal Reserve took almost no steps to halt the slide into the Great Depression over 1929–33. Instead, the Federal Reserve acted as if appropriate policy was not to try to avoid the oncoming Great Depression, but to allow it to run its course and "liquidate" the unprofitable portions of the private economy. In adopting such "liquidationist" policies, the Federal Reserve was merely following the recommendations provided by an economic theory of depressions that was in fact common before the Keynesian Revolution and was held by economists like Friedrich Hayek, Lionel Robbins, and Joseph Schumpeter. This paper reconstructs the logic of this "liquidationist" view, and argues that the perspective was carefully thought out (although not adequate to the Depression) and may have held some truth as applied to business cycles that came before the Great Depression.

The inaction of the United States government during the 1929–33 slide into the Great Depression is both astonishing and puzzling when viewed from any of the perpectives held today. All points of view today hold that governments should strive to provide a stable environment in which the private economy can operate, and should do this by keeping some broad nominal aggregate measure of spending or liquidity on a stable growth path. For monetarist economists, the measure to be stabilized is some definition of the nominal money supply.[1] For Keynesians, the appropriate aggregate is total nominal demand itself.[2]

As the conduct of economic policy while a depression is pending is concerned, these differences of opinion are relatively minor, for they all teach one central lesson: the central bank should pour reserves and liquidity into the banking system as fast as

*I wish to thank John Leahy, Murray Milgate, Robert Waldmann, and especially Barry Eichengreen and Randy Kroszner for helpful discussions, and Hoang Quan Vu for enthusiastic research assistance.
[1]See Milton Friedman (1984).
[2]See Robert Hall and John Taylor, *Macroeconomics*

possible[3] in order to keep the money stock and demand from collapsing during depressions. Above all, the central bank should not aggravate depressions by unexpectedly imposing contractionary policy on an already weakening economy.

This, however, was not the policy followed during the Great Depression.[4] The Federal Reserve did not push reserves into the banking system during the 1929–33 decline. It passively stood by while the nominal money stock fell by a third. The federal govenment did not increase its spending while allowing its tax revenues to fall. Instead, strenuous efforts were made to balance the budget and keep it balanced.

These policies were disastrous. They certainly did not stop the contraction in economic activity. They may well have severely aggravated it, and presumably played an important role in making the 1929–41 depression into the *Great* Depression. Alternatives were considered. Factions within the Federal Reserve system did argue for expanding liquidity during the downslide.[5] They were overruled by those who thought that the economy needed to go through a period of "liquidation" in order to lay the groundwork for renewed expansion. "Liquidationists" pointed to the short (but sharp) 1921 recession, argued that it had laid the groundwork for prosperity in the 1920's, and pushed for similar deflationary policies—which they mistakenly hoped would assist the release of capital and labor from unproductive activities, and lay the groundwork for a similar boom in the 1930's.[6]

The current of mind that underlay "liquidationism" was not a freak belief held by central bankers and makers of policy alone. Such a "liquidationist" theory of the function of depressions was in fact a common position for economists to take before the Keynesian Revolution, and was held and advanced by economists as eminent as Hayek,

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[3]And the fiscal authorities should cut taxes and accelerate spending as much as necessary.
[4]See among others Milton Friedman and Anna Schwartz, *A Monetary History of the United States,* Lester Chandler, *America's Greatest Depression,* Peter Temin, *Did Monetary Forces Cause the Great Depression?* and *Lessons from the Great Depression,* Barry Eichengreen, *Golden Fetters: The Gold Standard and the Great Depression,* and Charles Kindleberger, *The World in Depression 1929–1939.*
[5]Friedman and Schwartz, *Monetary History,* Epstein and Ferguson, "Loan Liquidation…" Temin, *Lessons from the Great Depression.*
[6]Barry Eichengreen, *Golden Fetters: The Gold Standard and the Great Depression.*

Robbins, and Schumpeter. In squeezing an already-weak economy, the makers of American economic policy were to some degree acting as John Maynard Keynes believed that policy makers always act: they were "madmen in authority" obeying voices in the air which were to some degree echoes of academic debates.[7] Academic economics gave central bankers a warrant for their contractionary depression-era policies.

In the aftermath of the Great Depression, the intellectual rout of the liquidationists and the victory of the Keynesians was complete. Pre-Keynesian business cycle theory receives less than a footnote in post-World War II macroeconomic texts.[8]

This paper reconstructs the logic of the "liquidationist" view. Its first substantive section sets out their main articles of belief. Its second section presents a simple model in the tradition of their vision—in which depressions are unpleasant but unavoidable episodes in the growth of a dynamic economy facing an uncertain future, in which attempts to use expansionary policies to keep investment high in a depression are positively destructive and inimical to the general welfare, and in which high unemployment in a depression is really a sign that the market economy is doing its job and is the best conceivable social mechanism for controlling production and distribution. And a third section speculates on the origins of "liquidationism."

These tasks are worth carrying out for at least reasons. First, it is worthwhile to do the history of economic thought right. Previous generations of economists were as smart and keen sighted as the present generation. To understand what they believed, and why they believed it, sheds light on the actual workings of economies and on economists' present beliefs.

Second, the existence of "liquidationism" played a key part in motivating public policy decisions not to fight the gathering Great Depression. The history of economic policy and economic activity in the Great Depression cannot be done right unless done

[7]John Maynard Keynes, *The General Theory of Employment, Interest and Money* (London: Macmillan, 1936).
[8]One of the few exceptions is Salant (1989).

against the background of the "liquidationist" perspective that so many influential people—cabinet officers, central bankers, academics, and so on—held.

I. The Great Depression and the "Liquidationist" Perspective

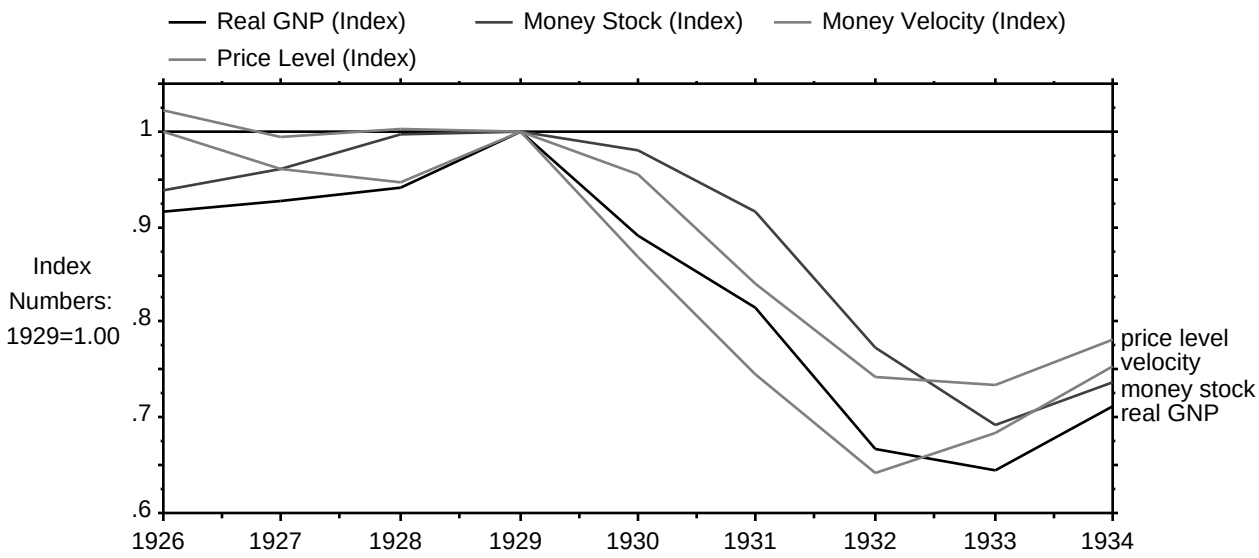
From late summer 1929 up to the inauguration of Roosevelt, all macroeconomic indicators in the United States signalled what modern economists would see as a grave and immediate need for expansion. The stock market declined in nominal terms at 35 percent, and in real terms at 25 percent per year. The price level and the nominal money stock both fell at about 8 percent per year. A flight to quality pushed interest rates on government securities and on short-run paper issued by the most credit-worthy firms down, while the nominal interest rates at which corporations could borrow for the long term rose.[9]

Economic Policy Under Hoover

Throughout this decline—which carried real GNP per worker down to a level 40 percent below that which it had attained in 1929, and which saw the unemployment rise to take in more than a quarter of the labor force—the government did not try to prop up aggregate demand. The only expansionary fiscal policy action undertaken was the Veterans' Bonus, passed over President Hoover's veto.[10] That aside, the full-employment budget surplus did not fall over 1929–33.[11]

[9]Peter Temin, *Did Monetary Forces Cause the Great Depression?*
[10]Chandler, *America's Greatest Depression.*
[11]E. Cary Brown, "Fiscal Policy in the Thirties: A Reappraisal," *American Economic Review* 46 (December 1956), pp. 857–79.

Figure 1
Macroeconomic Variables in the Great Depression



The Federal Reserve did not use open market operations to keep the nominal money supply from falling. Instead, its only significant systematic use of open market operations was in the other direction: to raise interest rates and discourage gold outflows after the United Kingdom abandoned the gold standard in the fall of 1931.[12] This inaction did not come about because they did not understand the tools of monetary policy.[13] This inaction did not come about because the Federal Reserve was constrained by the necessity of defending the gold standard.[14] The Federal Reserve knew what it was doing: it was letting the private sector handle the Depression in its own fashion. It saw the private sector's task as the "liquidation" of the American economy. It feared that expansionary monetary policy would impede the necessary private-sector process of readjustment.

Contemplating in retrospect the wreck of his country's economy and his own presidency, Herbert Hoover wrote bitterly in his memoirs about those who had advised inaction during the downslide:

[12]Peter Temin, *Lessons from the Great Depression.*
[13]See Friedman and Schwartz, *Monetary History.* They find that the Federal Reserve had an essentially complete grasp of the tools of monetary policy by the mid-1920's.
[14]The U.S. in 1931 held nearly half the world's gold reserves, and was far from the point where a looser monetary policy might trigger a successful speculative attack on the gold standard (Eichengreen, 1991).

> The 'leave-it-alone liquidationists' headed by Secretary of the Treasury Mellon…felt that government must keep its hands off and let the slump liquidate itself. Mr. Mellon had only one formula: 'Liquidate labor, liquidate stocks, liquidate the farmers, liquidate real estate'.…He held that even panic was not altogether a bad thing. He said: 'It will purge the rottenness out of the system. High costs of living and high living will come down. People will work harder, live a more moral life. Values will be adjusted, and enterprising people will pick up the wrecks from less competent people'.[15]

But "liquidationism" was not the creation and responsibility of a cabal of cabinet members headed by Andrew Mellon. The Hoover administration's and the Federal Reserve's unwillingness to use policy to prop up aggregate demand during the slide into the Depression was approved by eminent economists of the day. From Harvard, Seymour Harris argued that just because the banking system was near collapse was no reason for the Federal Reserve to buy bonds for cash: "Open market operations are not the most effective method of dealing with… bank failures, any more than the proper way of filling numerous small holes on the surface of the earth is to flood the earth with water."[16] Also from Harvard, Joseph Schumpeter argued that there was a "presumption *against* remedial measures which work through money and credit.… policies of this class are particularly apt to…produce additional trouble for the future."[17] Similar calls to avoid attempts to use economic policy to ameliorate the depression came from many other eminent economists: Robertson, Hayek, Robbins, and others. "Liquidationism" saw itself, in Robbins' words, as "a point of view…[that was] the heritage of generations of subtle and disinterested thought" and that saw much further to the core of what was going on in the economy than other perspectives.[18]

Where to look to find the economists' argument? It is an old principle that to

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[15]Hoover, 1952, vol. 3, p. 30. Quoted in Wiseley (1977), p. 118, and then requoted in Kindleberger (1978), pp. 139–40.
[16]Seymour Harris, 1934, p. 104.
[17]Schumpeter, 1934; p. 20.
[18]Lionel Robbins, *The Great Depression* (London: Macmillan, 1935), p. vii.

ascertain the underlying theoretical vision it is best to avoid writings on *theory* and to instead examine writings on *policy*. Writings on theory are discursive. They are hedged with qualifications, exemptions, and elaborations. Writings on policy are compact. The intended audience is made up not of academics with time to think and read but of busy men of affairs. Such writings are much more disciplined. The author fears that those reading his message may soon flip the page, and so he strains every nerve to make sure that the points that are made are the central and important points and that they are made clearly and convincingly.[19]

In 1934 a group of the Harvard Economics faculty wrote and published a short book, edited by Douglass Brown, entitled *The Economics of the Recovery Program*.[20] These academic economists saw their book as an attempt to intervene in politics. They, who had long studied the economy, would try to convey in a brief space what had gone wrong to land the economy in its Great Depression, and how the recovery should be managed.

Joseph Schumpeter took on the task of writing the chapter on what business cycles and depressions really were. Thus he wrote Schumpeter (1934), which gives the clearest exposition of the "liquidationist" line of argument that was believed by Mellon, other makers of policy, and other economists like Hayek (1931, 1935),[21] Harris (1934), and Robbins (1935).

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[19]For example, Friedrich Hayek's business cycle theory is almost impossible to grasp from his theoretical works, like *Prices and Production*. Hayek uses an "Austrian" analytical apparatus that was built as a tool for anti-Marxist capital theory. But when he is trying to reach a larger audience, and to compress his message into a small space, it comes through clearly. Consider the passage from *The Road to Serfdom* (Chicago: University of Chicago Press, 1947) *infra.*

[20]I owe my knowledge of this source to Charles Kindleberger.

[21]"Austrian" economists were not the only source, even though they were one source, of liquidationist doctrines. "Austrian" attempts to develop formal business cycle theories, however, did not mesh well with their approach to capital theory and the determination of the rate of interest. The businessmen's point of view as laid out by Mellon, and the frameworks sketched out by Robbins and Schumpeter are flawlessly transparent compared to the opaque theoretical writings of Hayek. The same holds true, to a lesser degree, for Schumpeter: it is more difficult to determine why Schumpeter believes the Great Depression happened by reading his two-volume, seven-hundred page 1939 *Business Cycles* than by reading his thirty page 1934 "Depressions."

The Liquidationist Argument

Schumpeter begins from the observation that the course of economic development is never smooth. Investments and enterprises are gambles on the future, made by innovative entrepreneurs who see new things to be done or new ways to produce old commodities. Sometimes these gambles will fail. The actual future that comes to pass is one in which *ex post* certain investments should not have been made, or in which *ex post* certain enterprises should not have been undertaken because they are not producing the requisite profits. The economy is left with "too much" capital given what the state of technology factor supplies, and demand turned out to be, or is perhaps left with the "wrong kinds" of capital.

The best that can be done in such a situation is to shut down those production processes and enterprises that were based on guesses about the way the future would look that did not come to pass. The liquidation of investments and businesses releases factors from unprofitable uses; they can then be redeployed to other sectors, used to produce socially useful current services (in the "too much" capital case) or alternative investment goods (in the "wrong kinds" case), and used by further waves of entrepreneurs in new gambles on a still-uncertain future. But without the initial liquidation, the redeployment and the subsequent wave of innovation and entrepreneuship cannot take place.

It follows, says Schumpeter, that depressions *are* this process of liquidation and preparation for the redeployment of resources. From Schumpeter's perspective, "depressions are not simply evils, which we might attempt to suppress, but…forms of something which has to be done, namely, adjustment to…change." This socially productive function of depressions creates "the chief difficulty" faced by economic policy makers. For "most of what would be effective in remedying a depression would be equally effective in preventing this adjustment" (Schumpeter, 1934; p. 16). The process of dynamic economic growth requires that underutilized factors register their availability on markets. Policies that stimulate demand in recessions keep factors

engaged in activities that do not produce value in excess of social cost. Such policies keep factor markets from registering the potential availability of productive resources for redeployment.

Is it possible to iron out the cycles, leaving an economy growing steadily on some equilibrium path rather than irregularly with rapid booms and slumps? Schumpeter thinks not. The preface to his *Business Cycles*(New York: McGraw-Hill, 1939) stresses that business cycles are *not* "…like tonsils, separable things that might be treated by themselves." It asserts that business cycles are "…like the beat of the heart, of the essence of the organism that displays them" (p. v). In order for one wave of entrepreneurship to be followed by another, prospective entrepreneurs must know where and in what quantities resources available for recombination and redeployment are available. Until they can learn this, they face "the imposibility of calculating costs and receipts in a satisfactory way…[T]he diffculty of planning new things and the risk of failure are greatly increased.…[I]t is necessary to wait until things settle down…before embarking on [new] innovation" (pp. 135–6).

Schumpeter argues that monetary policy does not allow policy makers to choose between depression and no depression, but between depression now and a worse depression later. "Inflation…pushed far enough [would] undoubtedly turn depression into the sham prosperity so familiar from European postwar experience," claims Schumpeter. But, he goes on to say, it "would, in the end, lead to a collapse worse than the one it was called in to remedy" (Schumpeter, 1934; p. 16).

Hence his "…analysis leads us to believe that recovery is sound only if it does come of itself. For any revival which is merely due to artificial stimulus leaves part of the work of depressions undone and adds, to an undigested remnant of maladjustment, new maladjustment of its own which has to be liquidated in turn, thus threatening business with another [worse] crisis ahead" (Schumpeter, 1934; p. 20).

Since the basic maladjustment is past investments and lines of business that have turned out to be socially unproductive and in need of liquidation, the "trouble is

fundamentally *not* with money and credit," but with past overinvestment. Stimulative monetary policies, therefore, "are particulary apt to keep up, and add to, maladjustment, and to produce additional trouble for the future" (Schumpeter, 1934; p. 20). Moreover, words like "stimulative" carry a special meaning in this context: if private sector actions would lead to a fall in, say, the nominal money stock, then a public sector attempt to counteract the consequences of such private-sector actions by injecting sufficient reserves to hold the nominal money stock constant would be "stimulative."

Hayek's (1931) rejection of expansionary policies is the same argument: the belief "that a general crisis can be averted by extension of credit" is a "popular fallacy." Moreover, "the great expectations attached to…public works in times of depression [are]…fallacious," for public works also "bring about all those evil effects which…arise when [the] money [supply] is increased." His conclusion, expressed most clearly in his 1944 *Road to Serfdom,* is that even if the economy could be stabilized at full employment this would not be good policy:

> This problem [of unemployment]…is one which will always be with us so long as the economic system has to adopt itself to continuous changes. There will always be a possible maximum of employment in the short run which can be achieved by giving all people employment where they happen to be and which can be achieved by monetary expansion…but…with the effect of holding up those redistributions of labor between industries made necessary by…changed cicumstances.…[T]o aim always at the maximum of employment achievable by monetary means is a policy which is certain in the end to defeat its own purposes… and lower productivity (p. 208).

In some ways, Hayek was a moderate. Lionel Robbins (1934) went so far as to attribute the extraordinary depth and length of the Great Depression to excessive *expansionary* monetary policy. He wrote that: "The moment the boom broke…Central Banks of the world… set to work to create a condition of easy money.…The process of liquidation was arrested." This was a mistake. For:

> [i]n…a boom many bad business commitments are undertaken.… [Goods] are produced…which it is impossible to sell at a profit. Loans are made which it is impossible to recover.…[W]hen the boom breaks, these …commitments are revealed.…Nobody wishes… bankruptcies. Nobody likes liquidation as such.… [But] when the extent of mal-investment and over-indebtedness has passed a certain limit, measures which postpone liquidation only make matters worse (Robbins, 1935, pp. 72–5).

Robbins' diagnosis was that the world economy in the 1930's needed more, not less deflation: "In the present depression we eschew the sharp purge. We prefer the lingering disease." He thought that a significant opportunity had been lost because of governmental unwillingness to impose a real deflation in 1930. He thought it a pity that "a more astringent policy in 1930" had not been followed. For he thought it would have quickly liquidated the backlog of excess investment and unsound enterprise, and would have been unlikely "to cause more disturbance and dislocation than…have actually been caused by [liquidation's] postponement."

In abstract theory there is no *a priori* reason for the redistributions of labor and machines from socially unproductive to socially productive lines of enterprise to require prolonged unemployment and idle capacity. Frictions in markets—labor unions, relocation costs, imperfect information, and so forth—mean that this process of reallocation entails unemployment, slack capacity, and temporarily reduced production. Before entrepreneurs in lines of business that should expand become aware of the availability of additional factors, such factors must be released from their past uses. They spend time in "inventory" while their availability for redeployment registers on the supply side of the marketplace. Thus Robbins and Schumpeter argued that appropriate policy was not to try to pump up aggregate demand and so stop the process of liquidation and reallocation: that process would have to be carried through eventually; postponing it simply magnified the social costs.[22]

[22]Note that the Schumpeterian argument can look with favor on welfare state policies like unemployment insurance. Since all benefit from the redeployments that take place as a result of unemployment, it is inefficient for workers rendered unemployed to bear the entire cost of lost income since they do not reap the subsequent benefits.

Dissent from Liquidationism

This doctrine—that in the long run the Great Depression would turn out to have been "good medicine" for the economy, and that proponents of stimulative policies were shortsighted enemies of the public welfare—drew anguished cries of dissent from others. The British economist Ralph Hawtrey scorned those who, like Robbins, wrote at the nadir of the Great Depression that the greatest danger the economy faced was inflation. To call for more liquidation and deflation was, Hawtrey said, "to cry, 'Fire! Fire!' in Noah's flood."[23] Milton Friedman (1974) recalled that at Knight, Simons, and Viner's Chicago such dangerous nonsense was not taught, but he understood why at Harvard—where such nonsense was taught—bright young graduate student economists might rebel, reject their teachers' macroeconomics, and become Keynesians.[24] Keynesianism might be false but it was not insane, and it was not as false as what graduate students were being taught by Schumpeter.

John Maynard Keynes himself (1931) tried to discredit the "liquidationist view" with the rhetoric of ridicule. He called it an "imbecility" to argue that the "wonderful outburst of productive energy" during the boom of 1924–29 had made the Great Depression inevitable. He spoke of Hayek, Robbins, Schumpeter, and their fellow travelers as:

> …austere and puritanical souls [who] regard [the Great Depression] …as an inevitable and a desirable nemesis on… "overexpansion" as they call it.…It would, they feel, be a victory for the mammon of unrighteousness if so much prosperity was not subsequently balanced by universal bankruptcy. We need, they say, what they politely call a 'prolonged liquidation' to put us right. The liquidation, they tell us, is not yet complete. But in time it will be. And when sufficient time has elapsed for the completion of the liquidation, all will be well with us again… (Keynes, 1972; vol. XIII, pt. 1, p. 349)

[23]I owe this quotation to Peter Temin.
[24]Friedman's report on the state of Chicago thought during the early stages of the Depression is supported by Davis (1971); it is challenged by Patinkin (1978) and by Johnson (1969).

In spite of some opposition, the "liquidationist" view carried the day over virtually the entire world during 1929–33, and over much of the world during 1933–39. Even governments that had unrestricted international freedom of action—like France and the United States with their massive gold reserves, and like Britain after its departure from the gold standard—tended not to pursue expansionary monetary and fiscal policies on the grounds that such would reduce investor "confidence" and hinder the process of liquidation, reallocation, and the resumption of private investment (see Temin, 1989; Eichengreen, 1991; Hall, ed., 1989).

The Eclipse of the "Liquidationist" View

After the Great Depression and World War II the victory of the Keynesians was complete. Nothing was left of the doctrines of "liquidationists"—it was not easy to learn what the doctrines had been.[25] Post-World War II courses in macroeconomics did not teach how modern theories were better than, or even what the theories of their predecessors had been.[26] They proceeded in logical sequence, not in historical sequence, from a model of full-employment Walrasian equilibrium to one with Keynesian (or monetarist) cycles (Patinkin, 1982).

The business cycle theories that had held sway before the Keynesian revolution were dealt with only in asides. Miton Friedman (1974) speaks of how outside of Chicago interwar macroeconomics was dominated an "atrophied and rigid caricature of the quantity theory" that could not guide economic policy. Keynesians like Galbraith

[25]Salant (1989) is one of the few chroniclers of the Keynesian revolution who refers to "liquidationism," calling it the "'crime and punishment' theory of business cycles.

[26]Dim echos of some "liquidationist" concerns can be heard in some of the internal debate within monetarism over which monetary aggregate to stabilize. For the early Friedman (1974), this was an empirical question: which monetary aggregate is the best leading indicator of total nominal demand? For others like Brunner and Meltzer (1974), or like the later Friedman (1984), this was a theoretical question: stabilizing which monetary aggregate corresponds to the government's not distorting private-sector incentives?

Pre-Keynesian debates over just what a "neutral" monetary policy was could become highly scholastic. Hayek (1931), for example, sees a world of difference between a policy that stabilizes the nominal stock of outside money and one that maintains a stable price level. The second, he believes, distorts private-sector incentives and inevitably paves the way for crises and depressions—he saw one of his major intellectual tasks as the overthrow of "the dogma of the stable price level" (Hayek, 1931).

(1965) and Samuelson agree. Paul Samuelson (1988) speaks of his teachers' belief in Say's law, which gave no theoretical room for Depressions because supply created its own demand. The impression left is that before Keynes economists had a theory of full employment equilibrium, but that they had no theory of substantial business cycle fluctuations. fluctuations—they did not have a theory of "underemployment equilibrium" to account for the years that the economy spent at the bottom of the cycle.

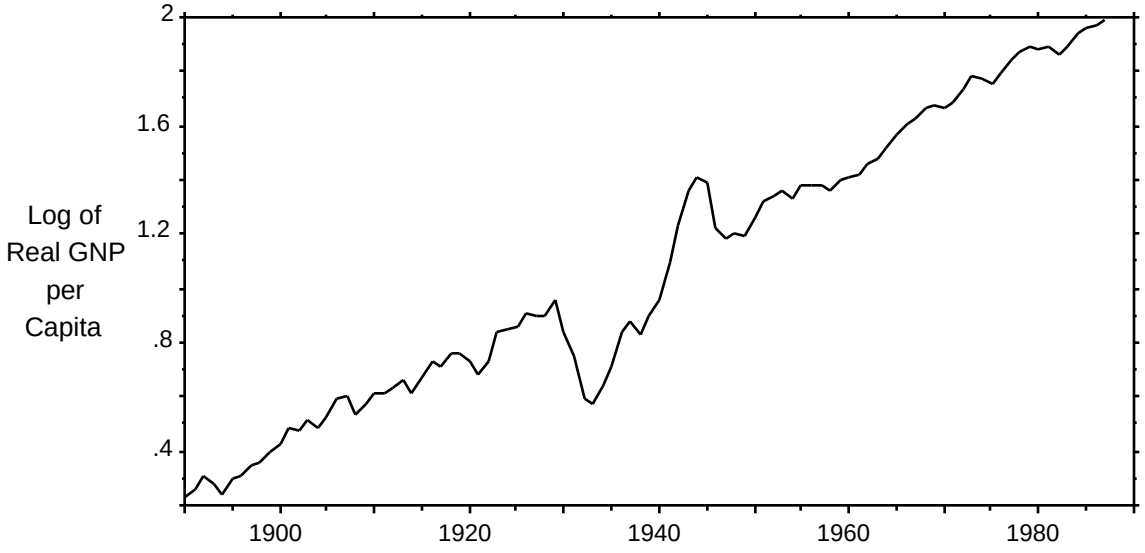
The apparent implication is that such economists could not provide reasoned theoretical support for the policies needed to counteract depressions. But in fact things were much worse. Liquidationists *did* have a theory of the business cycle. They argued loudly and vociferously for its application. Their theory of the business cycle ruled out as destructive just those policies that monetarists and Keynesians today believe might have been effective at countering or at least mitigating the Great Depression.

It was unfortunate for the economy that liquidationists were influential, and tried to apply their theory to the Great Depression. It does not fit. Figure 2 plots the course of real GNP per capita in the United States since 1890. Other recessions and depressions in the figure might perhaps[27] be interpreted as the process of liquidation of mistaken investments that will inevitably take place in a dynamic economy under uncertainty, The Great Depression is too large for such an interpretation to pass a minimal plausibility test. During the Great Depression real national product per capita fell back to its level of a quarter century before.[28] The measured U.S. net real capita stock was the same at the start of World War II as it had been in 1929.

[27]But I believe in most cases erroneously.

[28]Note, however, that the extraordinary greatness of the Depression is a feature that became clear only after World War II. Analysts in the middle of the Depression lacked the statistical information necessary to accurately guage its quantitative pulse.

Figure 2
United States Economic Growth, 1890–1988



It was unfortunate for the liquidationists as well that they tried to apply their theory to the Great Depression. Their catastrophic failure left them intellectually bankrupt, and ignored.[29]

II. Modelling Liquidation Cycles

This section is an exercise in translation: the translation of ideas that pre-World War II economists presented in verbal argument into the more formal and mathematical framework required of modern economic theory. The formal framework is useful because it forces an accounting of reactions and consequences that is easily evaded in verbal arguments: Do all markets clear? Have all of the consequences been worked out? Are the assumptions consistent? The formal framework is also useful because it allows us to grasp the entire process and see it in our mind's eye more clearly.

[29]Robert Lucas, seeking intellectual ancestors, has written approvingly of pre-Keynesian theories' methodology. He praises their approach as based on the "…idea of mistaken…decisions triggered by spurious …signals" and on understanding these mistaken decisions "…as intelligent responses to movements in nominal 'signals' of movements in the underlying 'real' events we care about and want to react to." But he hastens to dismiss their substantive views (Lucas, 1981; pp. 9, 237).

But Schumpeter was no model builder. Gaps must be filled in to raise the story as told by Schumpeter to the level of consistency and formalization required of arguments made by macroeconomists today. Translation inevitably produces shifts in meaning. Translation into the language of modern economic theory is especially likely to do so. Theory enforces a high degree of consistency and explicit formalization on arguments made in it.

This section of this paper sketches a simple formal model of a "liquidationist" cycle, in which an economy solving a dynamic social maximization problem—that is, an economy that is doing the best that can be done at allocating scarce resources among alternative uses—under uncertainty does at times find it optimal to "liquidate" capital, enterprises, and sunk investments. Recessions do not arise because of avoidable mistakes or ineffective policies, but because the future is uncertain and investors cannot fully "pierce the veil of time and ignorance." In this model business cycles cannot—as Schumpeter said—be removed short of removing the dynamic element from economic growth itself.

Note that the formal model presented below gives only a slice, and only a partial slice, of liquidationist thought. It has only one sector, and so only one type of capital: that portion of the "liquidationist" argument that hinges on the wrong kinds and not just on too much capital being installed during boom years is suppressed. In addition, modern economics frowns on interpretations that present groups of investors or workers as making repeated patterns of mistakes.

Economists in the 1920's were perfectly willing to argue that a given recession had been generated by excessive and irrational overspeculation and overinvestment during the previous boom: speculation had been irrational, and a recession was required to work through the consequences. The recession cannot be avoided *ex post*, given the excesses of the previous boom, even though it could have been avoided *ex ante*, if the boom had been choked off when it began to be driven by irrational overspeculation. But such an argument does not pass the standards required of

economics today, and so the model presented below contains recessions that cannot be avoided *ex post* and could not have been avoided *ex ante* because there was no reason at the time to think that "overspeculation" was in progress. These are some of the shifts produced by the process of translation.[30]

The model constructed here is by no means complete. It does not account for why, released from the investment sector, productive resources are not employed in the next day in the consumption goods sector, but instead remain idle and in "inventory" for a time—that is presumably due to various market "frictions."[31] This section presents only the accelerator portion of a liquidationist business cycle.

The Model

Assume that the economy is populated by n identical firms, each of which faces costs of investing at rate i_t given by:

$$(1) \qquad i_t + \frac{n}{2\delta}\frac{(i_t)^2}{K_t}$$

where K_t is the economy-wide total capital stock, i_t denotes the rate of investment by each firm, and δ is a parameter. Aggregate to obtain the rate of investment I_t for the economy as a whole:

$$(2) \qquad I_t = n(i_t)$$

Define π^s_t as the expected present value of the quasi-rents to be received from

[30]The model of this section suppresses some additional currents in liquidationist thought as well. It was common to see a share of the "overbuilding" in a boom as a result of irrational speculative excess that placed resources in the hands of incompetent entrepreneurs and so led to investments that were poor bets even *ex ante.* According to this current, there are good decision makers and bad decision makers; all kinds prosper in a boom; only in a recession does the Darwinian market select against bad decision makers. Without recessions, the quality of economic leadership would over time become increasingly degraded.

Another defect is that the model has no space for agents who do not optimally process information. "Liquidationists" had no methodological predisposition against the belief that some investors make "mistakes" not only *ex post* but also *ex ante,* and that a depression could become necessary not only because of bad fundamental news but also because of a central bank failure to check irrational speculative excess.

[31]Pre-Keynesian theorists regarded these frictions as important for assessing the distributional costs of business cycles, but remote from the central engine of the cycle in durable goods production itself.

year t forward by a unit of capital put in place in year s. For simplicity, write π_t for π^t_t—the expected present value today of the returns from an extra unit of capital put in place today. Assume a constant real required rate of return r. Set the cost of a marginal unit of capital equal to its expected future quasi-rents. Then investment and the growth of the capital stock satisfy:[32]

$$(3) \qquad \delta(\pi_t - 1) = \frac{I_t}{K_t} = \frac{d}{dt}\ln(K_t)$$

Now turn to the quasi-rents received by a unit of capital. We assume that, at all times t >s, a unit of capital installed at time s yields a flow quasi-rent, denoted d_t^s:

$$(4) \qquad d_t^s = \frac{\alpha_t}{K_s}$$

In (4) α_t is an index of productivity at time t, and K_s is the total amount of capital installed at all times before s, and thus in place at time s. According to (4), old capital is more valuable than new capital—think of an economy with an unlimited number of projects of decreasing value, the returns to all of which grow as productivity grows. Let α_t grow at a proportional rate:

$$(5) \qquad \frac{\dot{\alpha}_t}{\alpha_t} = g_t$$

with:

$$(6) \qquad \dot{g}_t = \varepsilon_t - \frac{\sigma_\varepsilon^2}{r - g_t}$$

where ε_t, integrated over any time interval s, adds up to a random walk with variance $s\sigma_\varepsilon^2$. The proportional growth rate g_t of α_t locally follows a continuous time random walk, but its drift varies over time with the state of the economy.[33] Then the price as of

[32]Neglecting depreciation.

[33]Note that (5) and (6) describe a stochastic process in which as t approaches infinity the level of productivity α_t converges in probability to zero. The rate of growth g_t tends to drift downward over time. It eventually becomes and remains negative. We confine our attention here to the behavior of _t in the

time t of a unit of capital originally installed at time s is:

$$(7) \qquad \pi_t^s = \frac{\left[\alpha_t / K_s\right]}{r - g_t}$$

and the value today of an extra unit of capital built today is:

$$(8) \qquad \pi^*_t = \pi_t^t = \frac{\left[\alpha_t / K_t\right]}{r - g_t}$$

Equation (8) gives the current π_t, the shadow value of a marginal investment, as a function of the ratio K_t / α_t and the expected future growth rate g_t. These eight equations complete the model. When a driving force is added to the model in the form of a flow of news about what the future growth rate of productivity α is going to be—represented in the model by the process of shocks ε_t to the productivity growth rate g_t— the model produces liquidation cycles in investment. Figure 3 plots simulated investment cycles driven by news about future growth rates from four such simulation

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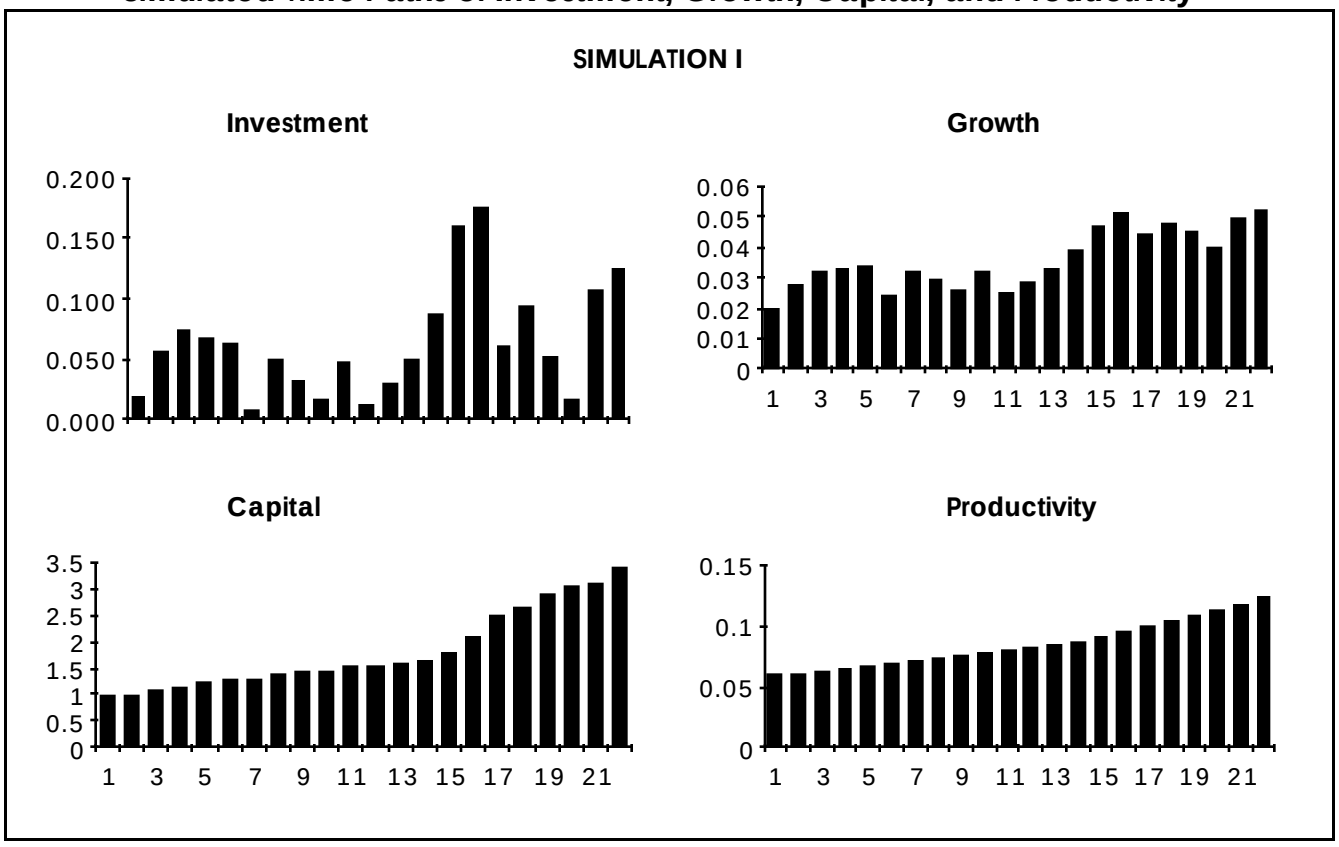
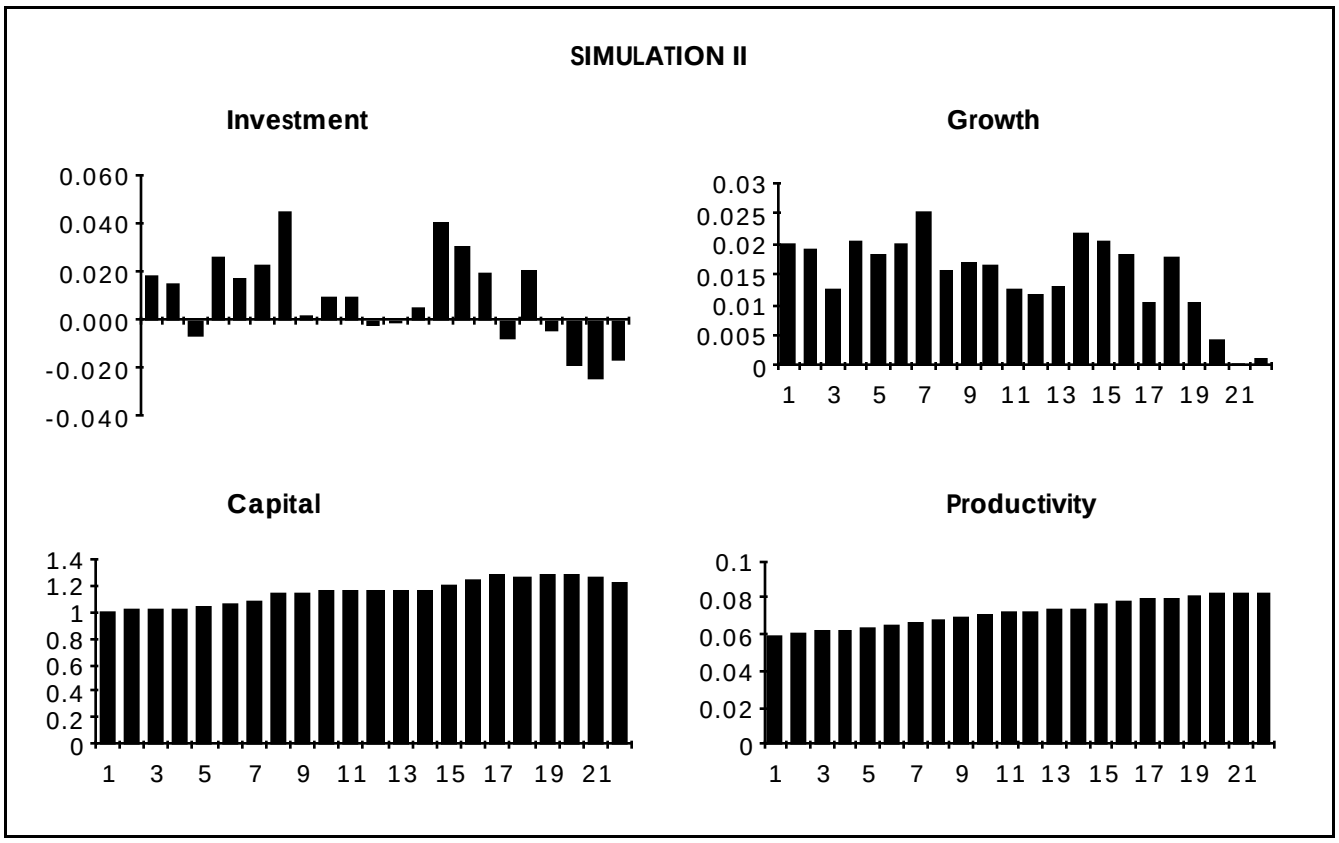
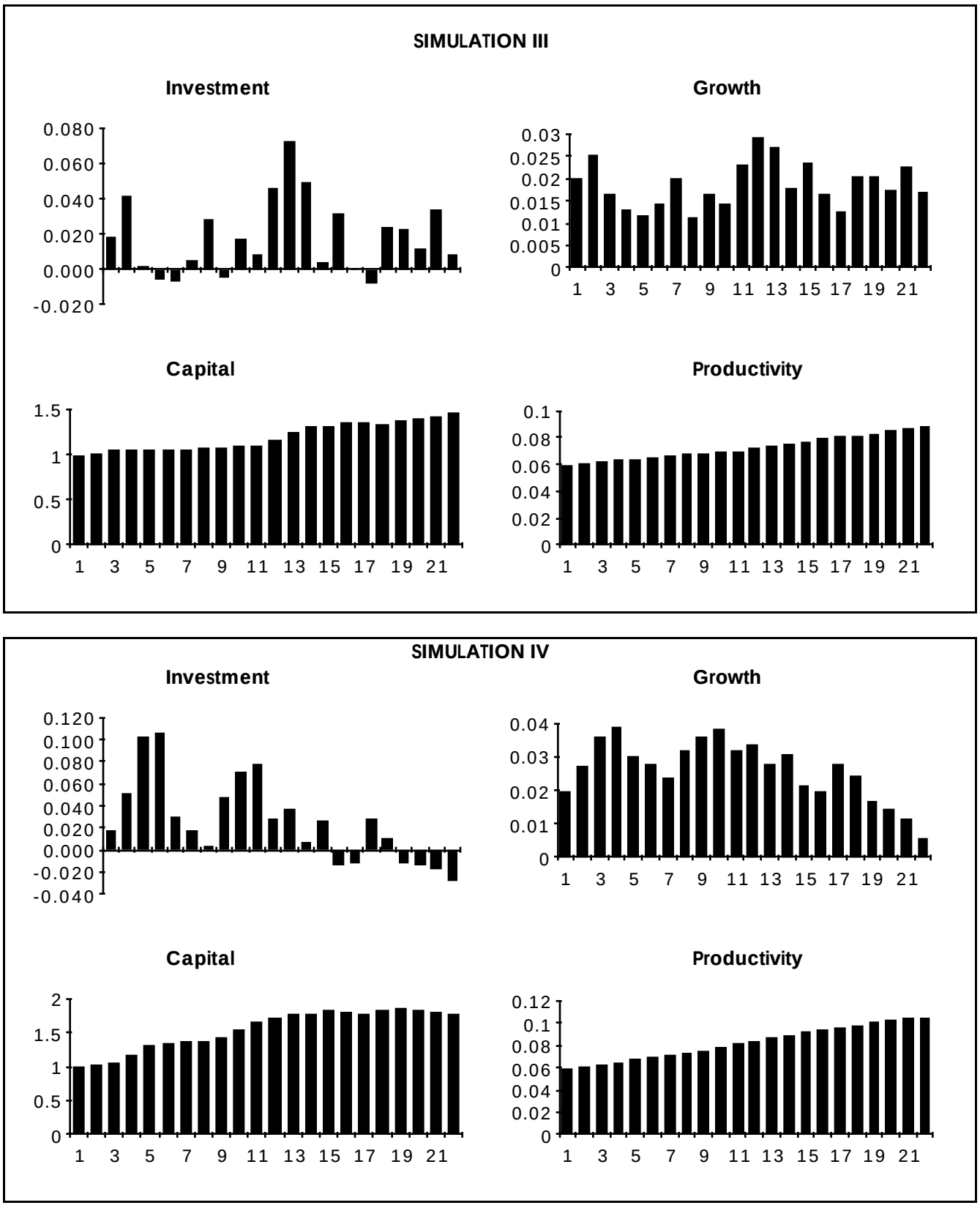
relatively near future, while the level of productivity is still growing and its growth rate g_t has not yet turned negative. The anomalous asymptotic behavior of α_t is a price that is paid for deriving the very simple closed-form asset pricing expressions (13) and (14).

Figure 3
Simulated Time Paths of Investment, Growth, Capital, and Productivity







runs. For each run it presents four panels, plotting the time paths of investment, of the current and expected future growth rate of the productivity parameter α, of the level of

the capital stock K, and of the level of the productivity parameter α.[34]

Figure 4 presents a schematic picture of why figure 3 shows times when investment leaps ahead at a rapid pace, and times when investment stagnates or even disinvestment occurs. Figure 4 graphs the K/α ratio on the horizontal axis, and the current rate of new investment π on the vertical axis. The curve $\Pi-\Pi$ shows, conditional on the current expected rate of growth g, the relationship between the value of new investment π and the K/α ratio given the expected growth rate g. The higher is K/α, the higher the prospective profits from new investment and the higher is π, and so the $\Pi-\Pi$ curve slopes downward. The higher is g, the higher are the profits from new investment and the higher is the $\Pi-\Pi$ curve.

Let the economy begin at point A. Given the current growth rate g, the level of the stock market is just high enough to keep the capital stock also growing at rate g and so the ratio K/α constant. If there were no shocks to the rate of productivity growth, the economy would remain at point A—with capital K and productivity α growing in synchronization at a constant rate g—indefinitely.

Now suppose that there is bad news about future growth: g falls. Because of the new, slower growth rate, the $\Pi-\Pi$ curve shifts downward as well, to $\Pi'-\Pi'$. It is not that present profits from new investments fall, but future profits are no longer expected to grow as fast. The value of π drops instantly as the bad news spreads throughout financial markets; the economy jumps instantly to point B in figure 4. If point B is associated with a value of π less than one—if the fall to the Π'-Π' curve is far enough—absolute disinvestment will take place. In any event, a period of stagnant investment or disinvestment and of a falling K/α ratio will follow as the economy slowly moves up the Π'-Π' curve to its new equilibrium at point C, at which the (lower) pace of investment is just sufficient to keep the growth of capital K in step with the (slower) growth of productivity α. A boom—a surge in investment following good

[34]Parameter values in the simulation runs are illustrative only: the discount rate r is set at 7.5%, the responsiveness __of investment to shifts in π is set at 0.2, the initial rate of growth $\_0$ of productivity is set at 2% per period, and each period _ is subject to a random shock ε_t with standard deviation 0.6%.

news about future productivity growth—would see the same process in reverse: a jump upwards in π, a surge in investment, and then a move down the Π-Π curve to a new, higher equilibrium value of K/α associated with the higher rate of productivity growth.

Figure 4
Response to Bad News About Future Productivity Growth

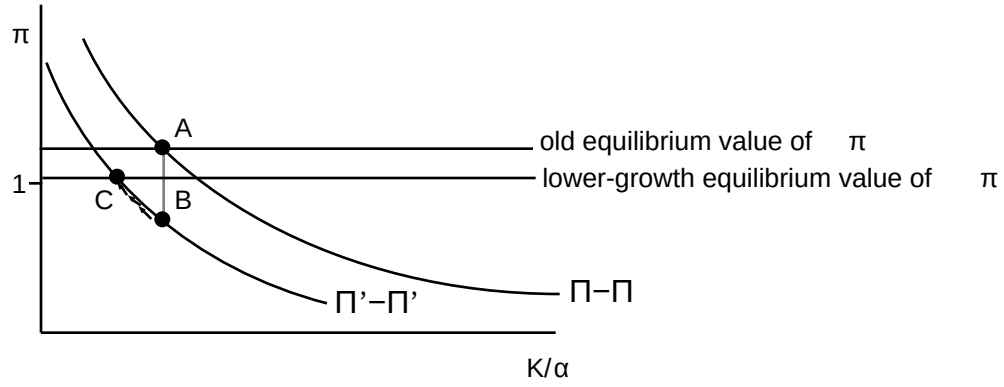


Figure 4 shows schematically the response to a single, once-and-for-all shock. But actual economies see not one shock but a whole process as mixed good and bad news of small and large magnitudes arrives in a constant flow. At times a flow of good news about future growth—a series of positive ε shocks—leads to an investment boom, as entrepreneurs hasten to put in place a large chunk of new capital that is expected to be profitable given the future path of productivity that they forecast. And at times the economy goes into depressions: the cumulative flow of news reveals that future growth rates will be lower than expected—a series of ε shocks that add up to a negative quantity—that capital has been overbuilt, and a substantial period of time will pass during which it will be optimal for there to be no investment or disinvestment.

The underlying "fundamental" to which the capital stock is being adjusted in the simulations of figure 3 is the level of the productive parameter α, which follows a smooth path over time. There are substantial costs of adjusting the capital stock. Too high a rate of investment or disinvestment in the short run quickly becomes very expensive. Thus there are strong incentives to smooth out the path of investment over

time. Yet even with all these sources of "smoothness" and gradual adjustment assumed in the model, the time paths of investment generated in the simulation runs are sharp, jagged, and variable.

These jagged paths are the best that can be done, given the rate at which news about future productivity arrives.[35] Because the future evolution of productivity is unknown and the current capital stock is expensive to adjust means that the economy will sometimes find that capital accumulation has fallen behind the *ex post* optimal pace, and hasten to catch up by means of a boom, and will sometimes find that capital accumulation has raced ahead of the pace that it turns out *ex post* would have been best, and then hasten to liquidate and redeploy. If the future were known then investment would follow a smooth and balanced-growth path. But in the environment of uncertainty and lack of foresight assumed in the model, investment follows the jagged path with irregular cycles simulated in figure 3.

Properly augmented by "frictions" that cause factors of production released from the capital goods sector to spend time in "inventory" before they are reemployed in other sectors, it could serve as a model of the business cycle.[36] The "accelerator" above provides a rationale for why reallocation of resources from consumption to investment goods sectors and back again is a pervasive feature of business cycles. The economy, maximizing a suitable objective function, must determine how much of its resources to devote to capital accumulation without knowing what the long run productivity growth rate will turn out to be *ex post.* The economy must guess; inevitably there will be times it discovers that it has overestimated future growth. The subsequent process of adjustment fis one of disinvestment and "liquidation." Recognition that the future rate of *growth* of technology will be slower carries with it a realization that there is an

[35]In a sense, this is the same point as that made by Kleidon (1986). Investment responds not to movements in _ but to movements in the expected discounted value of all future α's. Even though _ shifts only a small amount from period to period, the unstable nature of future productivity growth means that the expected discounted value of all future _'s shifts substantially.

[36]One such account of how the reallocation of productive resources across sectors could lead to unemployment is given by Lilien (1982).

"overhang" of capital, that old capital should be scrapped, and that new investment projects should be postponed until this capital overhang has been absorbed.

Economic Policy in the Liquidationist Framework

From the perspective of an economist who believes the model of business cycles laid out in the first part of this section, the policy recommendations of Hayek, Mellon, Robbins, Schumpeter and others—to let the private sector deal with the Great Depression, and to at all costs avoid any "inflationary" policy that might prop up real aggregate demand—appear sound and reasonable.

Suppose that, as in figure 4, there is bad news about future productivity growth or it is recognized too late by the securities markets that it ought to have incorporated previous bad news into market prices sooner. The Π-Π curve shifts downward. If the government allows the private sector to adapt to this shock by itself, the economy would evolve as in figure 4, jumping from point A to point B, and then undergoing a recession as the process of liquidation and redeployment moves it to its new equilibrium at point C.

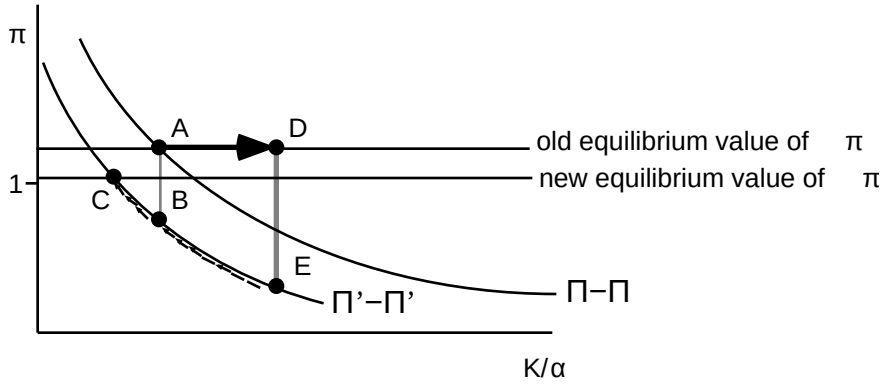
But suppose, instead, that the government takes active policy steps to prop up aggregate demand. It keeps investment high and heads off the depression by buying bonds, supporting their price, and so reducing the real interest rate below its long-run equilibrium value. Stock prices, the current value of new investment π, and the rate of investment all remain high.

What are the consequences? They are plotted in figure 5. The productivity parameter α no longer grows rapidly, and so maintenance of the previous high level of investment carries with it an increase in K/α. As long as the government maintains its stimulative policy the economy moves to the right, from point A toward point D in figure 5.

Eventually the policy of easy money must break down. The government cannot keep the real interest rate abnormally low indefinitely. Should it try to do so, a

hyperinflation will result. So eventually—when the economy is at point D—the easy money policy will break.

Figure 5
Destructive Effects of Stimulative Policies



At that moment the value of π crashes. During the extended, government-supported portion of the boom the economy has built its K/α ratio up so high that additional investment promises to yield very little. The economy jumps instantaneously to point E in figure 5. After the easy money policy has broken down, the excess capital overhang is enormous—equal to the difference in the horizontal coordinates of points E and C. The period of liquidation and depression that will ensue following the end of the easy money policy will be much more prolonged, and much more painful, than the original recession would have been had the government not tried to fight it. Originally, just that part of the economy's capital between points B and C required liquidation; after the easy money policy, all of the economy's capital between points E and C must be liquidated before equilibrium is reestablished and normal investment can resume.

This—or a less formalized doctrine akin to this—lay behind the aversion to expansion that figures like Mellon and Schumpeter felt during the Great Depression. This scenario underlies Schumpeter's belief that expansionary monetary policy produces only a "sham prosperity" and "in the end, lead[s] to a collapse worse than the

one it was called in to remedy."

The argument is logically consistent, once the premise about the nature of depressions is accepted. But why were so many willing to accept the premise? Certainly Keynes was not. He (1931; pp. 347–8) strongly argued that the boom of 1925–29 had not produced an economy with an unsustainable or unbalanced capital structure:

> While some part of the investment…was doubtless ill judged and unfruitful, there can…be no doubt that the world was enormously enriched by the constructions of …1925 to 1929; its wealth increased in these five years by as much as in any other ten or twenty years of its history.… [O]n the whole, I see little sign of any serious want of balance such as is alleged by some authorities. The rates of growth [of different sectors]…seem to me…to have been in as good a balance as one could have expected.…A few more quinquennia of equal activity might, indeed, have brought us near to the economic Eldorado where all our reasonable economic needs would be satisfied.

III. Sources of "Liquidationism"

Late-Nineteenth Century Railroad Cycles

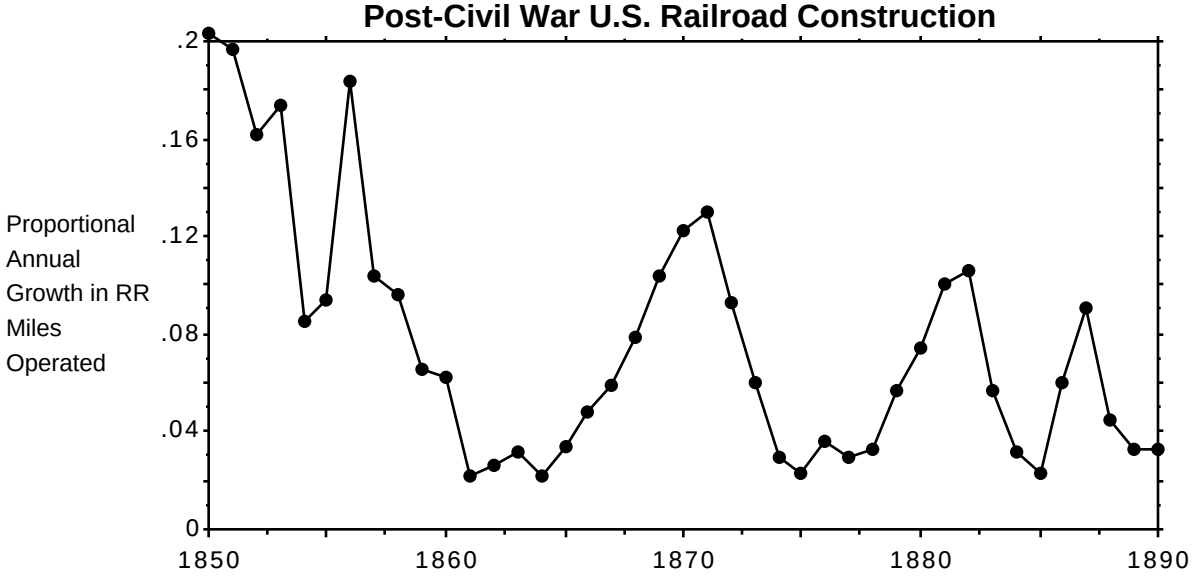
One possible answer is that the "liquidationist" point of view had in fact been correct in the past, or at least that it had not been grossly inconsistent with the business cycles which Schumpeter and his colleagues had experienced in the generations before World War I.

In countries that are undergoing rapid industrial revolutions and seeing rapid increases in their capital/output ratios, swings in investment driven by news about future growth may well be more important than in countries that have already undergone industrial revolutions and attained relatively stable capital/output ratios. In the U.S., the half century before World War II saw non-agricultural capital/output ratios nearly double (Abramovitz and David, 1973). For half a century the pace, direction, and completeness of U.S. industrialization was up for grabs: no one could know *ex ante* how many railroad lines it would be worth building west of the

Mississippi, or how many cities the size of St. Louis would spring up in the midwest.

But during this half century uncertainty was being resolved. Each year and half decade added more pieces to the puzzle as the long-term shape and growth rate of the American economy became more and more clear. If "Schumpeterian" causes ever played a role in business cycles, late nineteenth-century economies like the United States would see them at their relative maximum of importance. A "liquidationist" perspective might have been appropriate, and certainly appeared to be a reasonable, model for understanding pre-World War I cycles.

Figure 6
Post-Civil War U.S. Railroad Construction



For example, in 1870–1871 U.S. railroad construction reached its first post-Civil War peak. The number of miles of operated railroad in the U.S., then around 50,000, grew at about twelve percent per year. The construction of these 6,000 miles of railroad track each year (up from approximately 600 miles / year during the Civil War) required approximately one-tenth of America's non-farm paid labor force, and perhaps half of the production of America's capital goods industries. Four years later railroad construction had collapsed. In 1875, railroad mileage grew at only three percent—less than 2,000 miles of railroad were built. Railroad construction involved less than three percent of America's non-farm paid labor force, and consumed perhaps fifteen percent

of the potential production of America's capital goods industries.

As figure 6 shows, two more substantial irregular waves of railroad building, one peaking in 1881-1882 and a second peaking in 1887, passed through the economy before 1890. Each required an expansion of capacity in the railroad construction sector's suppliers—iron and steel for rails, timber for ties, mechanical equipment for locomotives and cars, furniture to equip the Pullman Co. cars to carry passengers on the new lines, and so forth—and a redirection of capacity from other industries and from idle status to the production of railroad lines. Each wave also required the redirection of perhaps one million workers to construction, and as the wave passed their reallocation into other sectors or into relative idleness. These swings in railroad construction, and the associated swings in total product, are what the pre-World War I world saw as "business cycles."

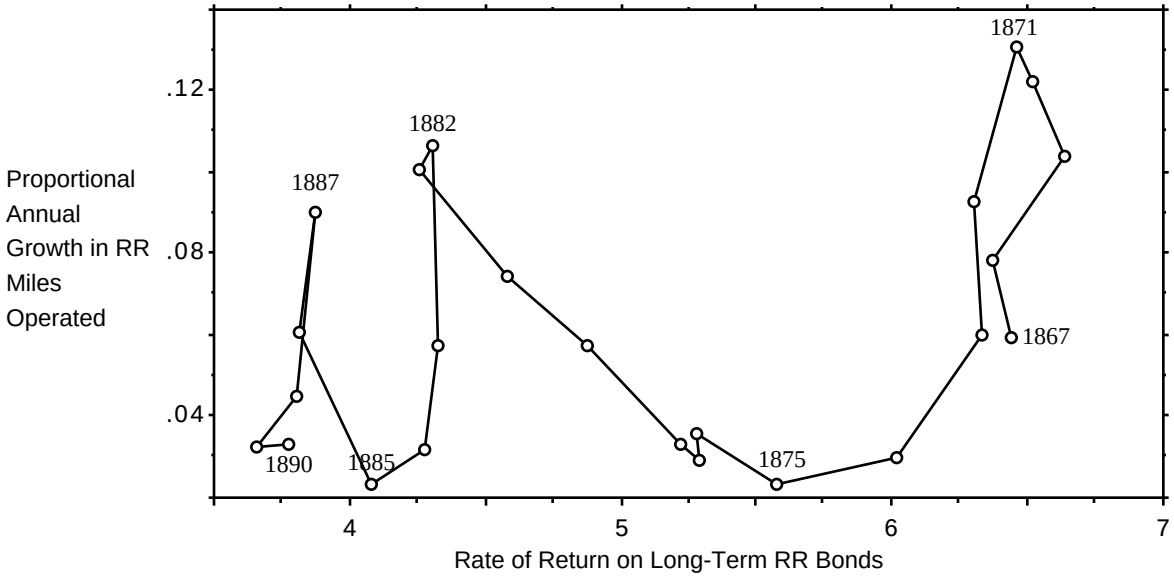
It is hard to interpret such late nineteenth-century railroad cycles as caused by the forces to which business cycles are often attributed today. The small government did not serve as a source of more than trivial fiscal shocks. There was no central bank to mistakenly squeeze off economic activity by keeping the money supply from growing sufficiently rapidly.[37] Indeed, the typical correlation over the 1870–1890 period goes the wrong way: the post-1871 fall in railroad construction is associated not with rising but with falling interest rates, as figure 7 shows.

It is difficult to attribute the railroad cycles to disturbances in financial markets. The financing of railroads was the predominant business of financial markets, and financial crises tended to result from downturns in railroad construction, not to cause such downturns. In 1873 Jay Cooke and Co. went bankrupt because bond buyers no longer believed that the northern tier of the great plains would be settled fast enough to make the Northern Pacific Railroad a money-making bonanza and to make its bonds

[37]The international gold standard almost surely did play a role in causing some of U.S. business cycles. 1893 and 1907 are prime candidates. But as Lewis (1978) shows, the business cycles in the industrial core of the world economy did not move in synchronization in the half century before World War I. Each country had its own internally-generated business cycle that was as if not more important in determining output than the international transmission mechanism of the gold standard.

worth par. Cooke had gambled in the late 1860's on the profitability of the Northern Pacific and the rapid settlement of the northern plains. New information revealed that he had been wrong. And his firm's bankruptcy had substantial consequences for the rest of the financial markets. But the principal shock came not from inside but from outside the financial markets. It was the recognition that the Northern Pacific would probably fail to pay its way.

Figure 7
Railroad Construction and Long-Term Bond Rates



By default, therefore, a "Schumpeterian" view of late nineteenth century railroad cycles appears as plausible as any. There *was* uncertainty about the long run growth of the American economy, especially where the settlement of the West is concerned. Railroads are sensitive to the growth of the regions they serve. Entrepreneurs did risk their fortunes and futures on their assessment of the quasi-rents to be earned from a particular line. Sometimes they guessed wrong: Jay Cooke and Co. failed because it had advanced more money for the construction of the Northern Pacific than it could recoup by selling Northern Pacific bonds. Its failure ushered in the panic of 1873 and the subsequent depression, which did not lift until five years had passed and construction resumed.

Thus railroad booms and busts of the late nineteenth century are not inconsistent with a "liquidationist" perspective. When long run rates of growth are unstable, investment for the future ought to be jagged, and ought to see periods of rapid expansion coupled with periods of quiescence and disinvestment. This was Schumpeter's insight.[38] It is a defensible view to take of the determinants of large investment cycles in rapidly-growing economies like the United States in the second half of the nineteenth century.

The claim made here is very limited. It is not that the "liquidationist" perspective provides the correct interpretation of late nineteenth century railroad cycles. I would, in fact, be somewhat surprised if this turned out to be the case. The claim is only that the liquidationist perspective was not *prima facie* inconsistent with and could in fact provide a natural explanation for nineteenth century railroad cycles.

In this context, it does not seem surprising that liquidationist theories became popular around and after the turn of the twentieth century. They made apparent sense of relatively recent historical experience. When the Great Depression came, theorists like Robbins and Schumpeter tried to make sense of it in the same framework. With hindsight we can see that the Depression was an order of magnitude larger than previous depressions, that it was not a period of accelerated structural change, and that as a result it is difficult to sustain an interpretation that sees it as necessary economic housecleaning. Schumpeter and his school were working within a macroeconomic framework that had once been reasonable, but had become inappropriate and proved unhelpful in understanding and guiding policy during the Great Depression.

Implications

Getting the history of economic policy during the Great Depression right

[38]Blanchard, Rhee, and Summers (1990) find a strong relationship between the stock market and investment over the twentieth century. To the extent that the stock market and investment are responding to the same factors and that large stock market swings are driven by shifting expectations of future growth, there appears to be a possibility that "Schumpeterian" investment dynamics have played a role in shaping the strength of business cycles, even if they have not determined their timing.

requires an understanding of the hold exercised by the "liquidationist" perspective. The Great Depression is a principal axis of twentieth century history. An astonishing feature of the Depression, from our perspective, is the unwillingness of governments to take steps to stimulate their economies during the slide of 1929–33. Advocates of the "liquidationist" perspective argued that the Depression had come about because the boom of the 1920's had led to a capital overhang, and that investment could not proceed until the productivity growth and depreciation had removed this excess past investment. The policy recommendations of "liquidationists" were followed for much of the Depression.

A large proportion of the capital stock was indeed liquidated. According to Blanchard, Rhee, and Summers (1990), by 1936 all net capital accumulation over 1924–29 had been erased. Yet the years between 1936 and World War II did not see a restoration of normal levels of activity and unemployment. This is a decisive experiment: whatever caused the Depression and no matter how applicable "liquidationist" theory may be to other episodes, the Depression was not caused by an overhang of unproductive capital, for it outlasted any plausible such overhang.

It was, therefore, bad advice that academic economists like Robbins and Schumpeter gave central banks and treasuries during the Depression. It is disturbing that so many smart economists could give such destructive policy advice.

It is also disturbing that the advice they gave was not unreasonable, given the business cycles that they had experienced. The market economy's allocation of resources between consumption and investment *does* involve the market's solving a dynamic problem in a stochastic environment. The arrival of news about future productivities and opportunities *does* imply that there will be times at which new information reveals that recent investments will not repay their costs. In such situations, the correct policy *is* indeed to help the process of structural readjustment and reallocation along, and not to delay reallocation by pumping up demand to freeze production in its old pattern. To the extent that late nineteenth-century railroad cycles

fit this pattern of speculation and overbuilding, it *would* have been counterproductive from a long-run perspective for the government to try to keep railroad construction at a high pace in a recession.

The advocates of the “liquidationist” point of view during the Great Depression were mistaken, but not crazy. In many histories (Chandler, 1973; Galbraith, 1965), the pronouncements of liquidationists appear to be incoherent barbarisms that were, inexplicably, believed. Such interpretations get the history of economic thought wrong. It is one thing to compare past barbarism to present enlightenment. It is another to reflect that Robbins and Schumpeter were as smart and as hard working as anyone in more recent generations—and were as sure that they knew the key to managing a fast-growing market economy.

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