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MISINTERMEDIATION AND BUSINESS FLUCTUATIONS

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ABSTRACT

Individuals plan consumption and production for different points in the future, using interest rates of various maturities as a guide. However, individuals do not always pre-contract all planned future borrowing and lending, and the intermediaries they work through often do not match the maturity structure of their assets and liabilities. As a result of this individual failure to hedge and institutional "misintermediation," aggregate production and consumption plans for each period in the future need not coincide. The resulting discrepancy will eventually appear as a recession or boom, involving an unanticipated change in interest rates. Fiscal stimulus aggravates the welfare loss associated with a recession, whether the spending is consumption-displacing or wholly wasteful.

Introduction

There is growing dissatisfaction in the economics profession with the plausibility of Keynesian macroeconomic theory. Many economists would prefer to see a neoclassical explanation of the overall workings of the economy, in terms of individuals who try to maximize their welfare, subject to their budget constraints in conjunction with appropriate prices.

However, it is a challenge to explain business fluctuations in terms of neoclassical theory, for the budget constraints lead us to Walras' Law, according to which there cannot be a net surplus of supply over demand when all markets are considered at once. Yet depressions, which in some sense are just such a net excess supply, do occur from time to time.

In this paper, we provide a neoclassical explanation of business fluctuations, in terms of intertemporal disequilibrium. There can be an excess supply of all current output, provided it is matched by an excess demand for aggregated future output. In a world of institutionalized "misintermediation" like our own, such a disequilibrium can easily come about and will have serious real costs. We then examine the welfare implications of counter-recessionary fiscal policy.

The Fisher Model

We begin with Irving Fisher's famous model of the simultaneous determination of the term structure of interest rates, planned consumption over time, and planned production over time.[1] Essentially this model is that of a

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[1] Fisher (1930, Part III). Fisher's model provides the basis for Hirshleifer's generalized discrete equilibrium over time (1970, 109-113). As Harry Johnson has pointed out, "...Schumpeter's statement that 'some future historian may well consider Fisher as the greatest of America's scientific economists up to our own day' [p. 872] has provided if anything too cautious an accurate prediction of subsequent scientific development: for Fisher's

Walrasian equilibrium, except that instead of n goods available at one point in time, there is only one good (aggregated consumption output), which can be available at any of n points in time. Instead of n-1 independent inter-commodity prices, there are n-1 independent intertemporal prices or discounting factors, from which the term structure of interest rates can be readily calculated. Only n-1 of the n equations setting excess demands equal to zero are necessary to determine the n-1 intertemporal prices. By Walras' law, one of these equations is redundant.[1]

If Fisher's equilibrium term structure prevails, the economy will develop without business fluctuations, provided there is no unforeseen change in tastes or technology. As the economy moves forward in time, there will be no discrepancies between planned production and consumption that arise from miscoordination of the efforts of individuals. This is the most we as economists can hope for. Welfare could be improved through better technological foresight, and individuals would have better luck achieving their ends if they did not change them in midstream, but these are not catallactic problems per se.

What Fisher failed to realize is that in the actual world in which we live, only the excess demand for current output is driven toward zero in the current period. In terms of current plans, excess demands for output in

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insights into monetary theory and capital theory keep his works in live teaching and scholarly use not only in every major economics department in the United States but wherever economics is a subject of serious teaching and research." Johnson's reference is to Schumpeter's History of Economic Analysis (London, 1954). (Johnson 1977)

[1]This is Hirshleifer's "redundant conservation relation" (1970, 113).

future periods may be positive or negative. Budget constraints imply that the present discounted value of these excess demands sum to zero, but not that they individually be zero. When we get to those future periods, these excess demands (or supplies) will then be driven to zero, but in the meanwhile, market participants will have been planning to produce either more or less in future periods than they were planning to consume. These plans will necessarily be disappointed, and it is these disappointments of plans that constitute the business fluctuations we explain with our model.

In an n-period world, instead of one redundant equation, there are actually n-2 degrees of indeterminacy to the set of possible term structures and corresponding planned consumption and production streams. In the 2-period world, clearing of the current market together with Walras' law guarantees clearing of the future market. However, in the 3-period world, clearing of the current market and Walras' law leaves one degree of freedom. In a 4-period world there will be two degrees of freedom, and so on.

Misintermediation

The term structure would assume its equilibrium shape if three conditions were met:

1. If savers put their savings into financial instruments whose maturities corresponded to their dissavings plans.
2. If borrowers borrowed by issuing financial instruments whose maturities corresponded to their repayment plans.
3. If financial intermediaries matched the maturity structures of their assets and liabilities.

Risk aversion in the face of interest rate uncertainty, along the lines described by Stiglitz (1970), provides savers and borrowers with an incentive to meet conditions 1 and 2 (to the extent that this is worthwhile, given actual transactions costs), provided they are free to write loan contracts of any maturity. However, financial intermediaries notoriously do not satisfy condition 3. Savings and Loan Associations, Mutual Savings Banks, and the savings departments of Commercial Banks traditionally are based on passbook accounts, which are virtually demand liabilities. They invest these funds in more or less long-term assets. In doing so, they are taking an economically unnecessary speculative position. We call such a mismatching of asset and liability maturities by an intermediary "misintermediation." The opposite policy of scrupulously matching maturities could appropriately be called "balanced intermediation."

In order to understand why thrift institutions misintermediate today, we apparently must go back to the origins of modern banking in the thirteenth and fourteenth centuries. At that time, banks could do whatever they pleased, provided they did not pay or receive interest. A bank could not promise to pay back 110 florins next year in exchange for 100 florins received this year, because a contractual obligation to repay more than was received was considered to be manifest usury, punishable by eternal damnation and, if that did not prove sufficient disincentive, by secular excommunication and ostracism. However, there was nothing to stop a bank from taking in a deposit of 100 florins with the understanding that it would invest this money "at its discretion," and then <u>voluntarily</u> give the depositor a "discretionary" extra 10 florins at the end of the year. These deposits "<u>a discrezione</u>" were the direct ancestors of our modern passbook-type savings deposits.[1]

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[1] De Roover (1954, 39-40, and 1963, 100-107). By investing these funds in foreign bills of exchange, the banks were not considered to be receiving

The strict usury doctrine has been defunct in the West since the French Revolution. If banks were unregulated, we would not expect it to have any residual effect on bank structure today. However, at least since the Mercantilist era, banking has possibly been the most closely regulated industry in the world.[1] Furthermore, finance is more vulnerable to regulation than other industries, since a large part of the value of a loan contract is the willingness of the courts to recognize and enforce it. And the regulatory law the courts recognize is intrinsically resistant to change.

One reason for this resistance, as Dicey has pointed out (1914/63, 41-46), is that if a body of law is reasonably successful in attaining its end, the principles on which it is based take on prestige in the eye of public opinion. The medieval structure of deposit banking was fairly successful in bringing savers and borrowers together. At least it was far superior to no intermediation at all. Public opinion therefore came to believe that the passbook represented the proper way in which banks should gather savings from the public. Two popular economic doctrines seem to have originated in this manner.

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interest on their assets, but only making legitimate nonusurious speculative profits on foreign exchange movements. (De Roover, 1963, 108-141). The London branches of the great Italian banks were the nucleus of banking in England as early as the fourteenth century. It was not until the seventeenth century that native English firms, mainly established goldsmiths, were able to get a toehold in the banking industry on Lombard Street. These Anglo-Saxon goldsmiths, however, did not invent banking in England, as the chauvinist myth alleges (Merchant, c1676). Rather, they merely performed the functions the "Lombards" had kept for themselves for centuries.

[1]In answer to a point raised by Paul Cootner, even during the "free banking" era in the United States, banks were far from unregulated. Free banking only meant that anyone complying with banking regulations was allowed to open a bank, without having to obtain discretionary permission. In every state, regulations took it for granted that banks would issue demand obligations (primarily bank notes) offset by term assets (often mortgages on western lands).

The first doctrine is the countereconomic notion that interest accumulates, rather than that it reflects the market price at which future payments are discounted. This is a subtle distinction of which even many economists are not fully aware. The accumulation notion is implicit in many of the fallacious theories of interest which Böhm-Bawerk first refuted only in the late nineteenth century (1914/59, vol. I).[1] Nevertheless, we continue to see evidence of this kind of thinking. For example, we see references to "the" rate of interest without reference to maturity.[2] Other evidence is the arbitrary identification of repayments as either "interest" or "principal", and the presumption that loans should be "redeemable" in advance, in effect giving them ambiguous maturity.

The second doctrine is that "borrowing short and lending long", or "creating liquidity" is a proper and valuable economic function of intermediaries.[3] This doctrine has been especially popular with governments and bankers since the development of central banking and inflationary finance in the sixteenth and seventeenth centuries, since it makes the money-creating role of banks seem more plausible. It certainly would be desirable if somehow intermediaries could enable producers as a whole to embark on long-term projects while guaranteeing to consumers as a whole the option of consuming their wealth as soon as they desire. However, this is technologically

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[1]Fisher's model is thoroughly Böhm-Bawerkian. Indeed, his Theory of Interest is dedicated to Böhm-Bawerk.

[2]This kind of thinking probably tends to flatten the term structure from its equilibrium shape. Indeed, requiring that the term structure be flat would just eliminate the degrees of freedom in the Fisher model with misintermediation.

[3]For example, Lapidus el at (1974), p. 27.

impossible.[1] Balanced intermediaries with negotiably rediscountable deposits would guarantee any one individual complete liquidity (up to transactions costs), and would provide the economy as a whole the option of consuming ahead of plan to the extent this is technologically feasible.

In the United States today, these doctrines manifest themselves in four principal categories of financial regulation or intervention that encourage misintermediation. The first is the governmental subsidy to misintermediation through the FDIC and FSLIC. Theoretically these are self-financing insurance programs. However, since depositary institutions all take qualitatively the same speculative stand on future interest rate movements, default due to interest rate changes is not an insurable risk.[2] So far the banking system has been able to finance the FDIC and FSLIC by itself from the seigniorage proceeds accruing to the zero ceiling (outside of New England) on checking account interest and from the monopoly rents on time and savings accounts when interest ceilings are effective. However, it would take only about four defaults the size of Franklin National Bank to exhaust (at least temporarily) the FDIC's reserves. In that case, the taxpayers would one way or another take the loss, either through an emergency act of Congress or inflationary finance at the Fed's initiative.[3]

The second category of regulation that encourages misintermediation is the ceiling structure on interest rates intermediaries may pay on savings and time deposits. Tobin (1970, 10) has noted that the objective of the

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[1] In terms of Figure 2 below, no financial institution, however ingenious, is capable of allowing the economy to consume the point w_0 on the c_0 axis. Even though this point is the sum of points that each individual is capable of consuming, this ability is contingent on not everyone doing it at once. The Law of Large Numbers is of no help here, in spite of the conventional wisdom to the contrary (e.g. Gurley and Shaw 1960, 194).

[2] Hence the high failure rate among state-sponsored insurance schemes prior to the FDIC (Klebaner 1974, 136-7).

[3] According to the chairman of the FDIC, "...were the FDIC ever to exhaust the funds available to it for insurance purposes, I have no doubt that Congress

FHLBB in imposing these ceilings on Savings and Loan Associations was to attempt to recoup the capital losses these Associations suffered during the interest rate rise of the Sixties. The FRB then was under pressure to impose complementary ceilings on commercial bank time deposits, even though commercial banks are not as extremely misintermediated as S & L's. As it happens, these ceilings backfired by causing the "disintermediation" crises of 1966 and 1969. Nevertheless, it should be remembered that they reflect the continued eagerness of regulators to preserve misintermediation by protecting it from its inherent shortcomings.

The third category is the hobbling of the retail "certificate of deposit" market that has appeared in the last fifteen years. CD's ideally allow the saver to specify exactly when he wishes to dissave, and to know what interest he will receive for that period. They also can let the bank know exactly when it can be legally called upon for cash outflows. Negotiability (or even assignability) can allow the saver the flexibility to change his plans by rediscounting his certificates, to the extent this is feasible given transactions costs and what other savers and borrowers are doing. However, only wholesale denomination CD's are allowed to be negotiable. Furthermore, as a typical advertisement for these deposits points out, "Federal regulations allow withdrawal before maturity provided the rate of interest is reduced to the regular savings account rate back to the date of issue and that three

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would act promptly to provide the FDIC with such additional borrowing authority or funds as might be needed to honor the Government's commitment to insured depositors." (Wille 1975, 6) Federal Reserve Board Chairman Arthur Burns has stated that the Fed would not hesitate to aid the FDIC even without Congressional direction. Indeed, the $1.77 billion the Federal Reserve Bank of New York lent the failing Franklin National Bank served largely to protect uninsured depositors.

Recently the Hunt Commission (1972, 77) has proposed a further subsidy to misintermediation through a Federal "insurance" program specifically designed to reimburse losses due to interest rate risk.

months' interest is forfeited at the regular savings account rates." This formula, or variations on it, virtually destroys the potential attractiveness of retail CD's. On the one hand, the saver is artificially locked in, even if a third party or the bank itself stands willing to take the certificate (or some fraction of it) off his hands on attractive terms. On the other hand, the bank cannot be positive it will not be legally required to cash the certificate before maturity.

The fourth category is the historical willingness of governments to accommodate banks when they get into financial difficulties, whether caused by misintermediation, bad loans, or just mismanagement. An example is the policy beginning in July, 1938, of allowing banks to value "sound" bonds on the basis of book rather than market value.[1] This willingness goes at least as far back as the introduction of central banking during the Mercantilist era. At least in part it is due to a recognition that banks that borrow short and lend long can be forced to close through no fault of their own.

Because thrift institutions are essential for economic progress, and they all happen to misintermediate, governments have taken special measures to protect them from their own fragility. Because they are protected, they are competitively viable against balanced intermediaries. Therefore all thrift institutions continue to misintermediate, and so forth in perpetuity.

That such an elaborate structure of economic misconceptions and detrimental intervention is apparently grounded in the medieval usury doctrine, which the Catholic Church already began backing out of in the sixteenth century, is one of the most remarkable illustrations of Sir Henry Maine's dictum on survivals:

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[1]Klebaner (1974), 161. More recently, just before the December, 1975 default by the government of New York City, Arthur Burns announced that the policy of the Fed would be to allow banks to cover up (not his choice of words) losses on these bonds by carrying them at pre-default values (Wall Street Journal, September 12, 1975). Banks are often able to make up such losses eventually out of their seigniorage profits.

> Everybody conversant with the philosophy of opinion is aware that a sentiment by no means dies out, of necessity, with the passing away of the circumstances which produced it. It may long survive them; nay, it may afterwards attain to a pitch and climax of intensity which it never attained during their actual continuance. (1861/1960, 132)

Perhaps in a world with unregulated financial markets, financial intermediaries would be forced by competition for the deposits of risk-averse depositors to match the maturity structures of their assets and liabilities. However, misintermediation and a regulatory environment encouraging misintermediation have been with us for six hundred years. There is no reason to expect that they will not be with us for another six hundred years. In the meanwhile, we may expect business fluctuations arising from intertemporal disequilibrium to continue to disturb economic development. We can, however, hope to understand how these fluctuations operate and the effects of conventional policies intended to combat them.

Even without policies encouraging misintermediation, transactions costs would prohibit the exact matching of maturities and the finding of the Fisherian equilibrium term structure. To that extent, even in an unrestricted market economy, misintermediation fluctuations might occur.[1] However, these fluctuations would be slight compared to the ones that actually occur in our world of institutionalized misintermediation. It is questionable whether it would be worth trying to eliminate these residual fluctuations, given the informational and transactions costs involved.

A Model of Fluctuations

The simplest world in which misintermediation fluctuations are possible is one in which there are only three periods, "t_0", "t_1", and "t_2". We may

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[1] This has been emphasized by Sherwin Rosen.

relate this model to the real world of continuous time by bracketing time into three periods and identifying each bracket with the date that corresponds to its economic center of gravity. (The bracket "t_2" is open-ended, but ordinarily has a finite center of gravity because the most distant future is discounted by prices approaching zero.) Thus each t_i may be thought of either as an interval of time or as a particular point in time. We represent real consumption goods during these three periods (aggregated over both commodities and the relevant time bracket) by "c_0", "c_1", and "c_2".[1]

At t_0 a real loan market exists in which c_1 may be traded for c_0 at a price δ_{001}, and c_2 may be traded for c_0 at price δ_{002}.[2] Also, c_2 may be traded for c_1 at the implicit forward price

$$\delta_{012} = \delta_{002}/\delta_{001}. \tag{1}$$

All these prices are discounting factors ordinarily less than unity. The first subscript represents the time in the market when the price is effective, the second subscript represents the time when the loan is to begin, and the third subscript represents the time when the loan is to be repaid.

From these prices we may compute the term structure of real interest rates in the market at t_0:

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[1] Strictly speaking, for the intertemporal aggregation to be valid, we must hold intrabracket forward rates constant (Liviatan 1966). In terms of the continuous-time discount curve (McCulloch 1971, 1975a), this implies the appearance of discontinuities in this curve as we change interbracket forward rates.

[2] These prices are equivalent to $\phi_{t_1}^{t_0}$ and $\phi_{t_2}^{t_0}$ in Hirshleifer's notation. See McCulloch (1971, 1975a) for details of inferring these pure discount prices from observations on bond prices.

$$r_{001} = \frac{-\ln \delta_{001}}{t_1 - t_0} \tag{2}$$

$$r_{002} = \frac{-\ln \delta_{002}}{t_2 - t_0} \tag{3}$$

$$r_{012} = \frac{-\ln \delta_{012}}{t_2 - t_1} . \tag{4}$$

Because of (1), if we know any two of these interest rates, we may calculate the third. The long spot rate r_{002} is a weighted arithmetic average of the short spot rate r_{001} and the forward rate r_{012}.

Given a linear production technology, the factors (whether original or produced in some earlier period) available to the economy will determine a convex production possibilities set as shown in Figure 1. This set is the set of all combinations of c_0, c_1, and c_2 that are feasible as of t_0. The production possibilities frontier $P_0P_0P_0$ is the set of production streams that are technologically efficient as of t_0.[1]

For any given term structure of interest rates at t_0, competitive profit maximization will lead factor owners to plan to produce the output supply stream S_0 shown in Figure 2 with maximal present discounted value w_0. The budget plane of all consumption streams with this present value is also shown in Figure 2. The slopes of its traces on the three planes defined by the coordinate system are related to the interest rates indicated. The steeper the line in absolute value, the higher the corresponding interest rate.

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[1]For a proof that such a frontier (Georgescu-Roegen's "input isoquant") is, in a linear von Neumann model, concave toward the t_0 origin 0_0, see Georgescu-Roegen (1951), 107.

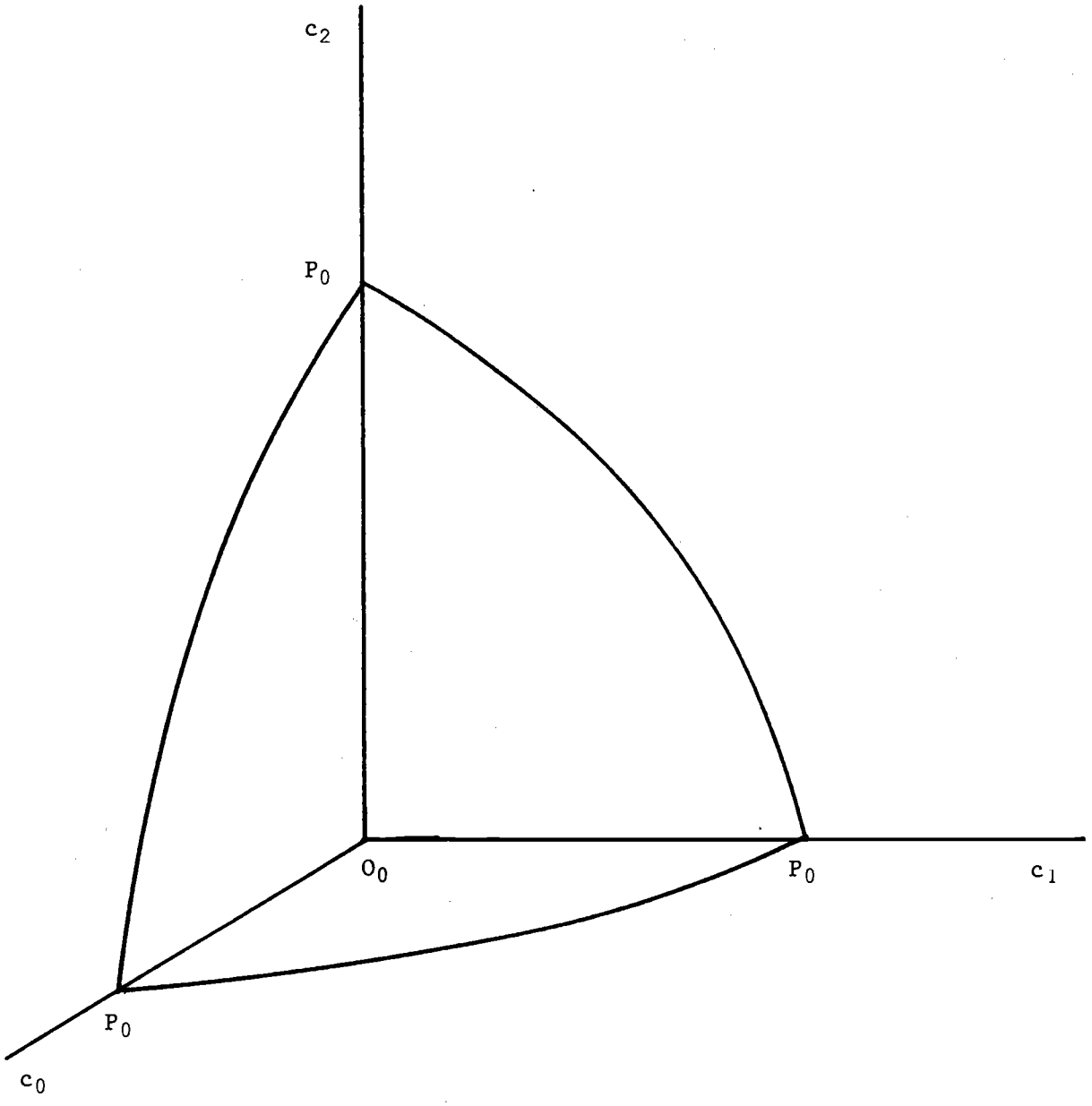

Figure 1

The economy's production possibilities frontier as of t_0.

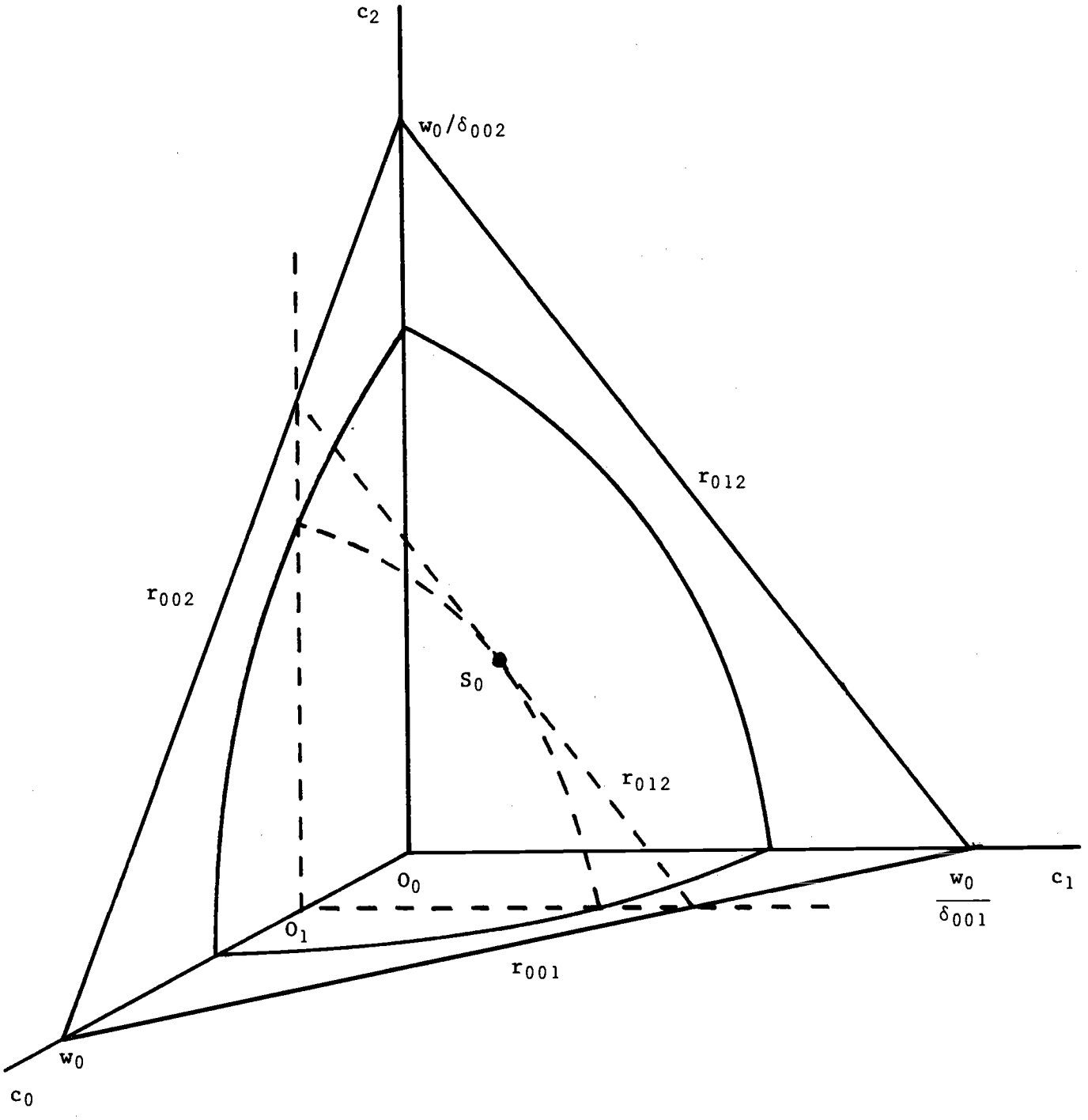

Figure 2

The economy's budget plane and planned production point (S_0) for a given term structure of interest rates during t_0.

As of t_0, market participants collectively think they can purchase any point on this budget plane. However, it will be immediately apparent, i.e. during t_0, if they demand a different quantity of c_0 than is being supplied. Therefore the c_0 components of the $t_0$supply point S_0 and the t_0 demand point D_0 will coincide, and we may concentrate on the section through $P_0P_0P_0$ and the t_0 budget plane indicated by the broken lines in Figure 2. There are three possible locations of D_0 relative to S_0.

First, the t_0 term structure of interest rates might just happen to have Fisher's equilibrium shape, in which case D_0 and S_0 will coincide in all three components. We will represent these interest rates by r_{001}^e, r_{002}^e, and r_{012}^e.[1] In this case, as time moves forward to t_1, participants will find that they were planning to produce exactly as much c_1 as they were planning to consume. There will be no unanticipated change in interest rates necessary to clear the market in t_1. Unless there is a change in tastes or an unforeseen technological development, r_{112} will just equal r_{012} (here equal to r_{012}^e). Note that we have no a priori presumption about the shape of this equilibrium term structure. The forward rate r_{012}^e may be higher or lower than the short-term spot rate r_{001}^e. Both are ordinarily positive for the reasons set forth by Böhm-Bawerk[2], but since the marginal

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[1] With unusual distributions of tastes and endowments, this equilibrium might not be unique. However, we do not regard this as very likely.

[2] (1914/59, Vol. II, Book IV). Fisher's example of shipwrecked sailors forced to survive on a fixed stock of figs does generate negative real interest rates. But, as Fisher points out, "The fact that we seldom see an example of zero or negative interest is because of the accident that we happen to live in an environment so entirely different from that of the shipwrecked sailors" (1930, 191-2). The Keynesian assertion (Klein 1966, 84-85) to the contrary deserves more careful scrutiny than it has received, in view of Böhm-Bawerk's argument. The possibility of a negative equilibrium nominal interest rate (Keynes 1923/1932, 190) is more real.

consumption wants and productive activities are in general completely different in the three periods, the span from t_0 to t_1 is historically unique and different than the span from t_1 to t_2, so there is no reason for the interest rates corresponding to these spans to be equal. In continuous time, forward rates are probably smooth, but otherwise the equilibrium forward curve can take on any shape: upward sloping, downward sloping, or oscillating. Therefore equilibrium development may require a substantial change in yields to maturity. However, this change will have been fully anticipated in forward interest rates.

Second, the forward rate r_{012} may be higher than its equilibrium value, in which case D_0 will have a lower c_1 component and a higher c_2 component than S_0, as shown in Figure 3.[1] This is the case of an impending recession. There is, in the minds of participants at t_0, an excess supply of c_1 and a corresponding excess demand for c_2. Walras' law requires that they be equal in present (t_0) value, but not that they individually be zero. As time moves forward to t_1, a recession will appear as the excess supply of c_1 becomes apparent in the current market for output. A value of r_{112}, necessarily lower than r_{012} and probably even lower than r_{012}^e, will be found that eliminates the excess supply.[2] Therefore a recession will be associated with an unanticipated fall in interest rates.

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[1] That there will be an excess supply of c_1 if and only if r_{012} is higher than r_{012}^e is demonstrated in the mathematical appendix.

[2] Amos Katz has pointed out that a fall in interest rates might conceivably enlarge the disequilibrium rather than closing it. However, for this to be true we must be in the vicinity of an unstable equilibrium, and the fall in interest rates will eventually take us to an adjacent stable equilibrium. (See Johnson 1971, p. 30.)

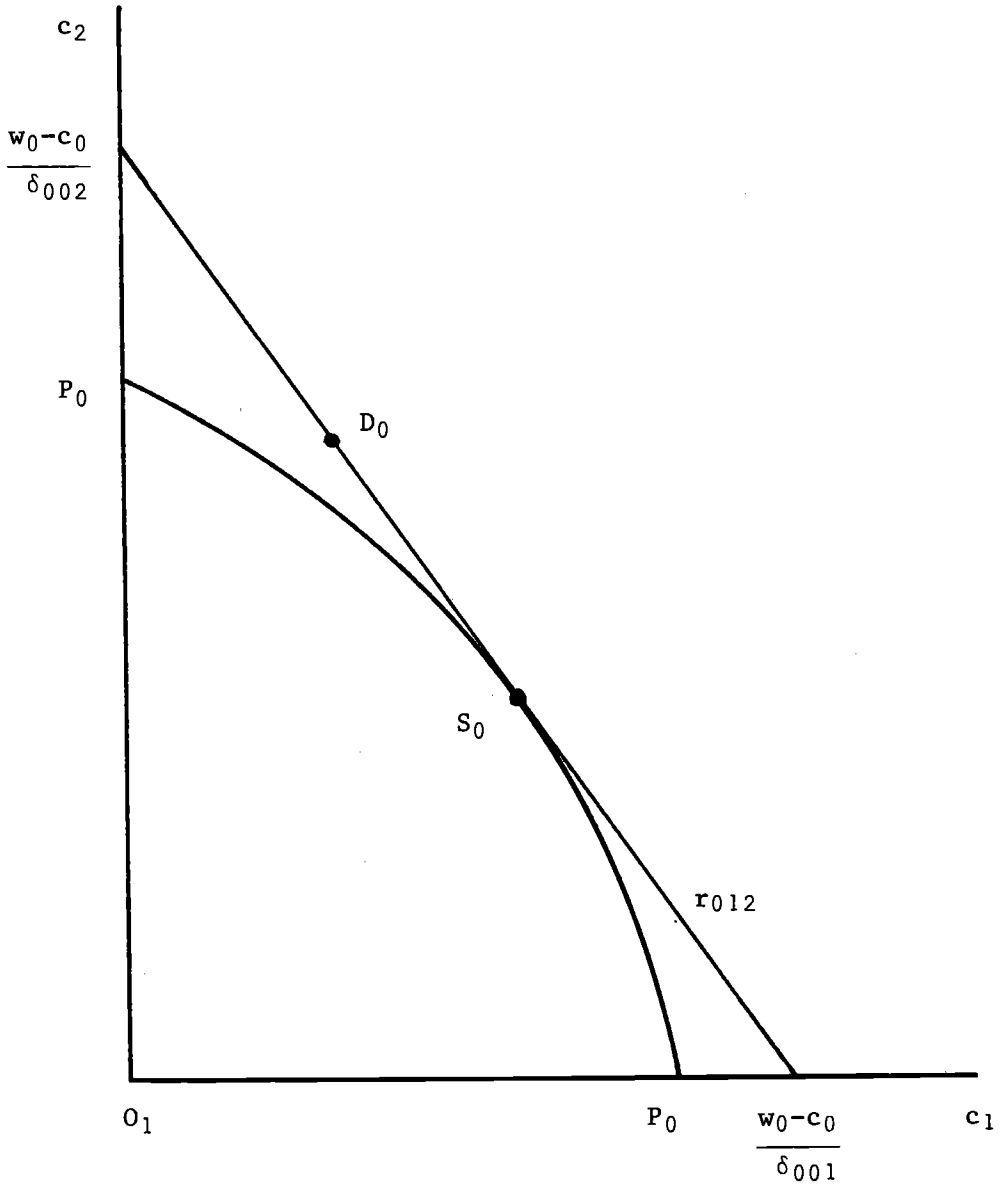

Figure 3

A cross-section through Figure 2 when r_{012} is above its equilibrium value. A recession is impending for t_1.

Third, the forward rate r_{012} may be lower than r_{012}^e, in which case D_0 will have a higher c_1 component and a lower c_2 component than S_0, as shown in Figure 4. This is the case of an impending boom. As time moves forward to t_1, an excess demand for current output will become apparent which will drive r_{112} up above r_{012}. Thus a disequilibrium boom is associated with an unanticipated rise in interest rates.[1]

If business fluctuations are associated with unanticipated changes in interest rates, rational expectations imply that those fluctuations cannot exhibit regular cycles, but rather must be random in nature. Irving Fisher (1925, 191) conjectured that the "business cycle" is nothing more than a "Monte Carlo cycle", that is, that business has no more regular a pattern than a gambler's luck at a fair casino. In another paper (McCulloch 1975b) we have tested this hypothesis and not found any strong evidence to the contrary. Therefore the noncyclic nature of the fluctuations we have described is in conformity with the observed business "cycle" rather than in conflict with it.

In terms of financial arrangements, an impending recession (as in Figure 3) means that during t_0 market participants are planning as a whole to produce more c_1 than they are planning to consume and to lend the proceeds from selling this output at the forward rate r_{012} in order to finance additional consumption of c_2 above and beyond their production of c_2. However, their planned lending is inconsistent, since no one is planning to borrow the surplus c_1 from them. During an impending boom, on the other hand (Figure 4), participants are planning (during t_0) to borrow during t_1 in order to finance additional consumption of c_1 beyond their own production, and to repay these loans during t_2 out of their surplus production. In this case the inconsistency

[1] Note that the excess supply or demand for c_1 does not actually appear during t_1, but only has reality in terms of the plans for the future people had during t_0. As Friedman has noted, "Inflationary Gap is never of the past or the present; it is always in the future." (1942, 314)

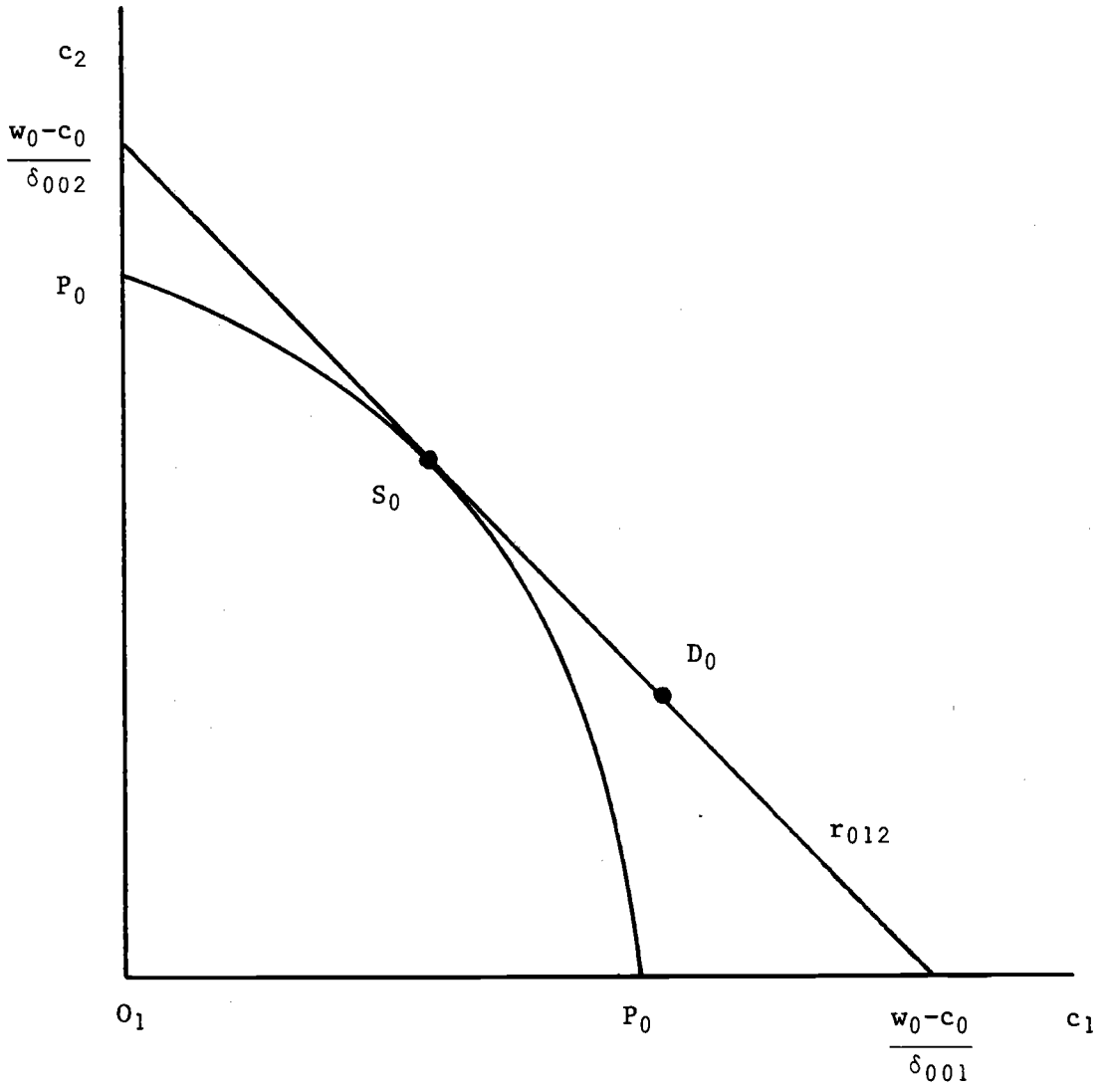

Figure 4

A cross-section through Figure 2 when r_{012} is below its equilibrium value. A boom is impending for t_1.

is that no one is planning to lend them this c_1. If all planned future borrowing and lending, whether by ultimate borrowers, by ultimate savers, or by financial intermediaries, were precontracted during t_0, this kind of inconsistency could not arise.

The Austrian Effect

Misintermediation fluctuations would involve no technological inefficiency and no welfare loss, except possibly for the small discrepancy between c_0 output and its ideal level, were it not for the contraction of the production possibilities frontier between t_0 and t_1. At t_0, the economy can produce any point on $P_0P_0P_0$ in Figures 1 and 2, or on its section P_0P_0 in Figures 3 and 4. To produce any particular output stream, certain productive activities will be necessary during t_0, t_1, and t_2. In general, these activity vectors will be different for every different output stream. In particular, the t_0 activities appropriate to the point S_0 will be appropriate to that point and to no other point on the t_0 production possibilities frontier. Therefore during t_1 the production possibilities set is not the set of points under P_0P_0, but only a proper subset of that set. The point S_0 will still be feasible, but since it is too late to go back and change the activities conducted during t_0, elsewhere the production possibilities frontier will have shrunk, to P_1P_1 as shown in Figure 5. P_0P_0 and P_1P_1 will osculate at S_0, but P_1P_1 will have a lower transformation elasticity than P_0P_0 in a neighborhood of S_0[1] and so will fall away from P_0P_0 as we move away from S_0.[2]

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[1]It is not actually necessary that P_1P_1 have a lower transformation elasticity than P_0P_0 at S_0 itself, but only in a deleted neighborhood of S_0.

[2]Phrased differently, the long-run transformation curve P_1P_1 in Figure 5 will be the envelope of short-run curves like P_1P_1 corresponding to different production decisions made in t_0.

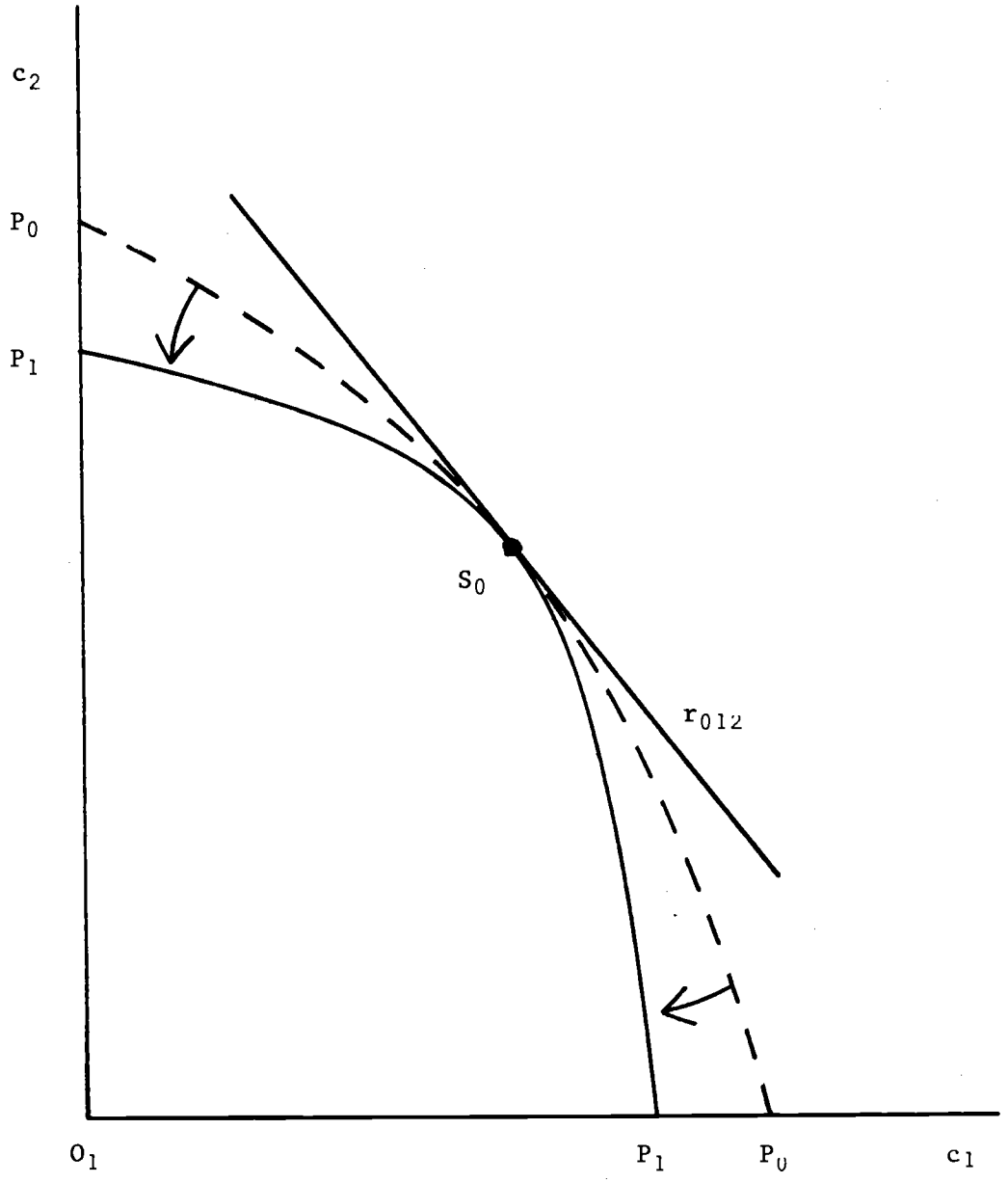

Figure 5

The "Austrian effect." As time moves forward from t_0 to t_1, the transformation curve between c_1 and c_2 contracts from P_0P_0 to P_1P_1.

This principle of vanishing intertemporal production possibilities has long been emphasized by the Austrian economists Mises and Hayek.[1] Essentially the way it works is that the numbers of the various types of capital goods produced during t_0 for later use are inappropriate to any point on the t_0 transformation surface except S_0. We cannot say that there were too many or too few capital goods produced during t_0, but only the wrong mix. This is the reason why Austrian writers, such as Lachmann (1966, p. 115), place such great emphasis on the heterogeneity of capital goods. A model with homogeneous capital hardly begins to deal with the problem of intertemporal plans, because according to it, the only decision to be made in t_0 is between c_0 and the future, without reference to how output is to be allocated <u>over</u> the future.[2]

Because of this "Austrian effect", it is essential for technological efficiency that production follow through with output stream S_0. This will occur if r_{112} equals r_{012}, but not otherwise. The unanticipated change in interest rates necessary to bring the t_1 demand point D_1 into coincidence with the t_1 supply point S_1 will require that S_1 lie <u>inside</u> P_0P_0, as shown in Figures 6 and 7. Therefore misintermediation fluctuations, whether booms or recessions, necessarily entail technological inefficiency and wasted resources.

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[1] See von Mises (1924/53, 357-66, and 1963, 553, 560, and 564). Indeed, the present theory grew out of an attempt to Fisherize Mises' theory of business fluctuations. Note, however, that in our theory, the recession is associated with an unanticipated <u>fall</u> in interest rates rather than a <u>rise</u>, as in the Mises-Hayek theory. Hansen's critique (1951, 384-93) of Hayek's popularization of Mises' theory completely misses the essential concept of the time specificity of investment.

[2] Much of the original development of the Austrian effect was in terms of the conversion of "circulating capital" into "fixed capital". In effect, this implies that P_0P_0 is a straight line, while P_1P_1 forms a right angle at S_0. We have here improved on this original version by making it more marginalist - that is to say, more "Austrian".

Sherman Maisel has pointed out that producers deliberately build flexibility into their capital equipment. That is to say, during t_0 they may aim for a point S_0' just inside P_0P_0 from S_0, but from which P_1P_1 will not fall off

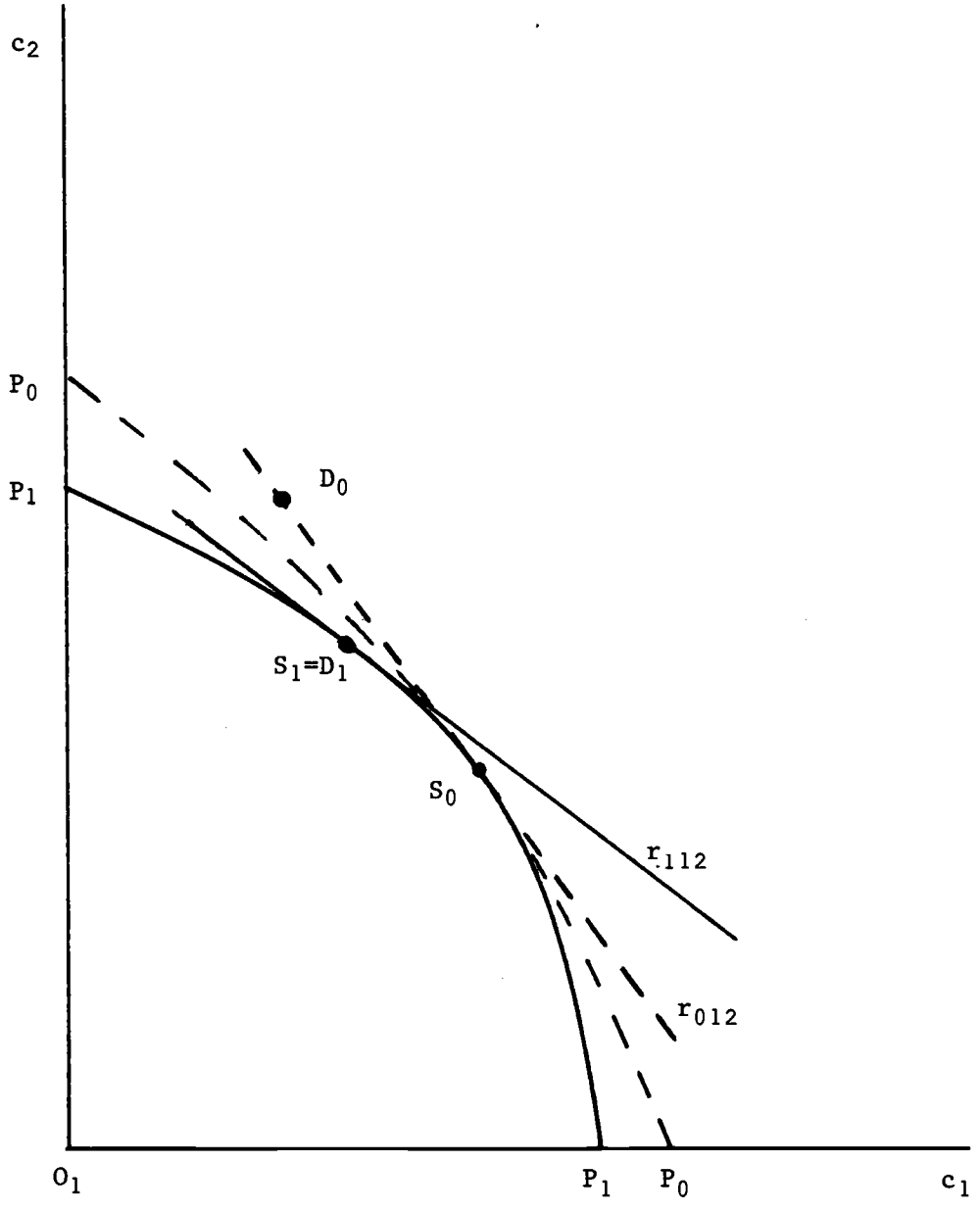

Figure 6

The unanticipated fall in interest rates associated with a recession. Production moves to a point S_1 inside the original production possibilities frontier.

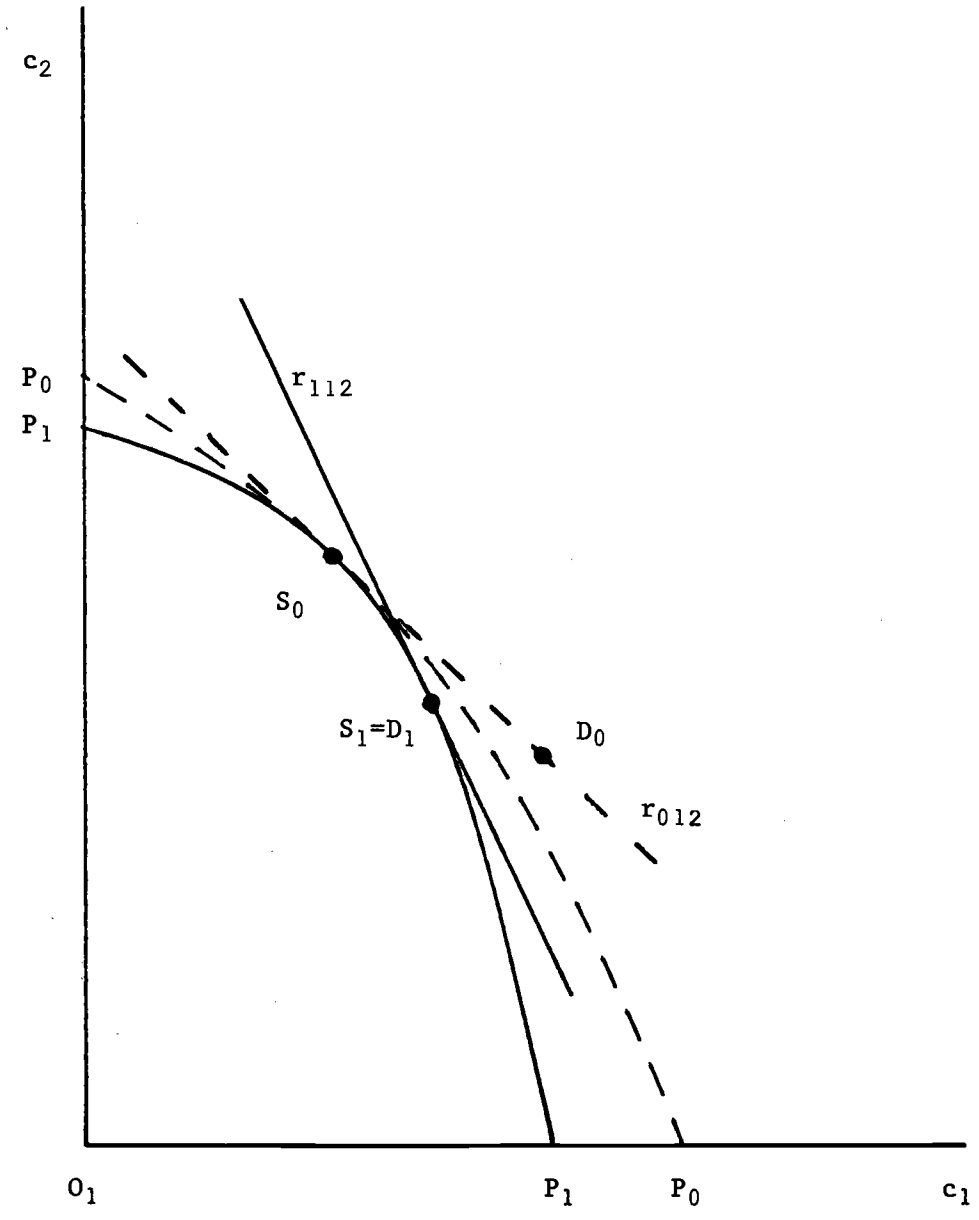

Figure 7

The unanticipated rise in interest rates associated with a boom. Again production moves to a point inside P_0P_0.

Factor Incomes and Unemployment

Given the economy's endowment of original factors of production in t_1 and t_2, and of produced factors produced before t_1, there will be a derivable vector of equilibrium factor prices corresponding to each output price ratio (i.e. each price of c_1 in terms of c_2 and corresponding interest rate linking t_1 to t_2). The prices of those factors of production that are relatively intensive in the production of c_1 will move, relative to the prices of factors intensive in c_2, in the same direction the price of c_1 moves relative to that of c_2.[1] Furthermore, by the "magnification effect", the relative factor price change will be larger than the relative output price change, in such a way that if the price of c_1 falls relative to c_2, the price of c_1-intensive factors will fall relative to both outputs.

Which factor services, then, are c_1-intensive, and which are c_2-intensive? Factor services available during t_1 contribute to both c_1 and c_2, so it is not immediately apparent how to classify them. However, factor services available during t_2 obviously contribute nothing to c_1. Therefore t_2 factor services must be c_2-intensive. It follows that t_1 factor services, taken as a whole, must be c_1-intensive. Individual factors may be found during t_1 that are c_2-intensive, but the general presumption must be that the real income of t_1 factors, whether the current services of labor, land, or capital equipment, will be directly related to the price of c_1 relative to c_2.

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with as low an elasticity of transformation as it does from S_0. If r_{112} equals r_{012}, they will incur a small loss, because they cannot quite produce S_0, but this cost will be worth incurring because r_{112} might be far from r_{012}. In spite of this valid point, balanced intermediation will remain beneficial, since it will minimize the price changes that do occur, which are still costly. Furthermore, it will reduce the amount of expensive flexibility producers will need to build in.

[1] See Johnson (1971, 18) for the case when there are only two factors. While during t_0 it is necessary to keep the heterogeneity of capital goods in mind in order to capture the "Austrian Effect", by t_1 this effect has already taken place, and we may aggregate factors into "c_1-intensive" and "c_2-intensive" for the purpose of analyzing factor incomes during the fluctuation.

During a recession, there is an unanticipated fall in the price of c_1 in terms of c_2. Corresponding to the anticipated price $1/\delta_{012}$ there was one set of equilibrium real remunerations for t_1 factors. Corresponding to the price $1/\delta_{112}$ necessary to clear the t_1 markets are lower equilibrium remunerations. Therefore if factors had been expecting rewards corresponding to the anticipated price of c_1, full employment during t_1 will require that most if not all current factors accept an unanticipated fall in their t_1 real incomes.[1]

If prices adjusted instantly and smoothly to the excess supply that appears during t_1 in a recession, there would be a fall (relative to expectations) in real wages, real land rents, and in real returns to capital. In practice, however, it will take some time for factor owners to feel out the market and revise their expectations.[2] We would therefore expect to find a misintermediation recession to be associated with pervasive, though temporary, unemployment of workers, factories, farms, and other factors of production.

Artificially maintaining pre-recession wages and factor returns would stall the market's process of salvaging the most it can from the malinvestment that occurred during t_0. Instead of moving from S_0 to S_1, production would move to a point inside of P_1P_1 that would represent prolonged factor unemployment.

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[1]The extent to which factors during t_0 can anticipate the returns corresponding to the anticipated price of c_1 is a subtle question that deserves further exploration. However, there is even less reason to believe that they will have been anticipating returns correspodning to any <u>other</u> price of c_1.

[2]The "search" literature provides numerous insights into this process. See Stigler (1961), Phelps (1970), and Rothschild (1973).

Thus, the policies of Hoover and Roosevelt during the '30's were exactly the opposite of what was necessary if the Great Depression was the result of misintermediation. We are told that

> Hoover believed that the maintenance of wage rates would contribute to sustaining economic activity and employment. This belief was simply the application to the depression of the general American high-wage philosophy that became popular in the 1920's. One of Hoover's first acts after the 1929 stock market crash was to summon industrial leaders to the White House and ask them to pledge not to cut wage rates. They agreed, and there was at the time little argument over the wisdom of this polciy. Later, of course, wage rates were cut, and by 1932 there emerged some public argument in favor of wage reduction as a cure for unemployment. However, Hoover did not change his position. (Stein 1966, 192)

Hoover's voluntary programs were unable to keep nominal wages from falling altogether, in spite of his great influence with business leaders. However, he was able to prevent them from falling as fast as consumer prices. When he left the White House in 1933, real wages were actually higher than at the beginning of the Depression,[1] and unemployment stood at 20.6% - even using Darby's correction (1976) of the BLS figures. At the same time, Hoover's Federal Farm Board acted as a Federally sponsored cartel in an unprecedented attempt to support farm incomes (Rothbard 1963, 203-9).

Roosevelt continued and even strengthened Hoover's policies of resisting market adjustment with the NRA,[2] minimum wage legislation, and the Wagner Act,

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[1]Average hourly earnings in 1957-59 dollars for city wage earners in manufacturing rose from 93.8¢ in 1930 to 97.0¢ in 1933. These figures would would seem to contradict Galbraith's claim (1955, 142-6, 188) that Hoover's efforts were entirely ineffectual.

[2]Charles Kindleberger (1973, 14-15) recalls that when his salary as an office boy was increased in 1933, his boss made it clear that he had given him the raise because he was required to by the NRA "and for no other reason."

which gave unions monopoly power over wages. An interesting hypothesis is that it was not until a major segment of the work force had its real wage expectations drastically reduced, by being forced to work for low and almost constant nominal wages in the military during World War II while the price level shot up by 51.7%,[1] that the country clearly came out of the depression. Compulsory reduction of real wages would have been effective, but not necessary to cure the Depression's unemployment rate, since real wages would have fallen of their own accord without the Hoover/Roosevelt policy of artificially maintaining them.

Among current activities, we would expect the extractive industries to be particularly sensitive to interest rate movements. At high interest rates, it pays to exploit mineral deposits relatively quickly. At low interest rates, it pays to leave the minerals in the ground for a longer period and to employ time-consuming techniques of lowering costs. We would therefore expect to see the extractive industries, and the new capital goods industries which use up the current output of such raw materials, lapse into unanticipated inactivity when interest rates unexpectedly fall during a recession. The demand for capital goods will tend to be met instead with rehabilitated or salvaged old machines. Mines and steel mills will languish, while junk parts yards will thrive, comparatively speaking. Ironically, the new capital goods industry may actually be more active with high interest rates than with low.

Welfare Considerations

In the actual world of diverse tastes and factor endowments, we cannot unambiguously say whether misintermediation fluctuations are a good or a bad thing, since some people will benefit and others will lose. In order to make

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[1] From 1941 to 1947.

blanket welfare statements, we must simplify somewhat, and think in terms of a "representative participant" who has representative tastes and representative factor endowment. The economy will then behave as if it were made up of a very large number of carbon copies of this individual, who will be in unanimous agreement as to how well off they are.[1]

When a recession is impending, the representative participant will plan to consume an output stream which gives him higher utility (U_0) than any feasible stream, since the corresponding indifference surface, a cross-section through which is shown in Figure 8, is separated from $P_0P_0P_0$ by the t_0 budget plane. The equilibrium utility level U_e, which <u>is</u> attainable, therefore lies below U_0, as shown. (The curve labeled U_e in Figure 8 does not quite touch P_0P_0 except in the unlikely case that the c_0 component of S_0 and D_0 is unaffected by the presence of a disequilibrium between c_1 and c_2.) Therefore an impending recession provides the representative participant with a sense of euphoria; his anticipated welfare level is higher than any feasible level.

When the recession strikes during t_1, the representative participant finds that the best he can do is to consume D_1. This point lies inside $P_0P_0P_0$ and therefore provides a lower utility level, U_1, than the highest attainable utility level U_e. Thus a recession implies a welfare loss. Furthermore, since U_e lies below U_0, the recession involves an even bigger disappointment of expectations. (We must evaluate the recession on the basis of U_1 instead of U_0, since U_1 represents the utility level of actually realized consumption, while U_0 is only the utility from planned consumption.)

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[1] For this simplification to be valid, individuals' tastes must be identical. Furthermore, either their factor endowments must be identical, or their tastes homothetic.

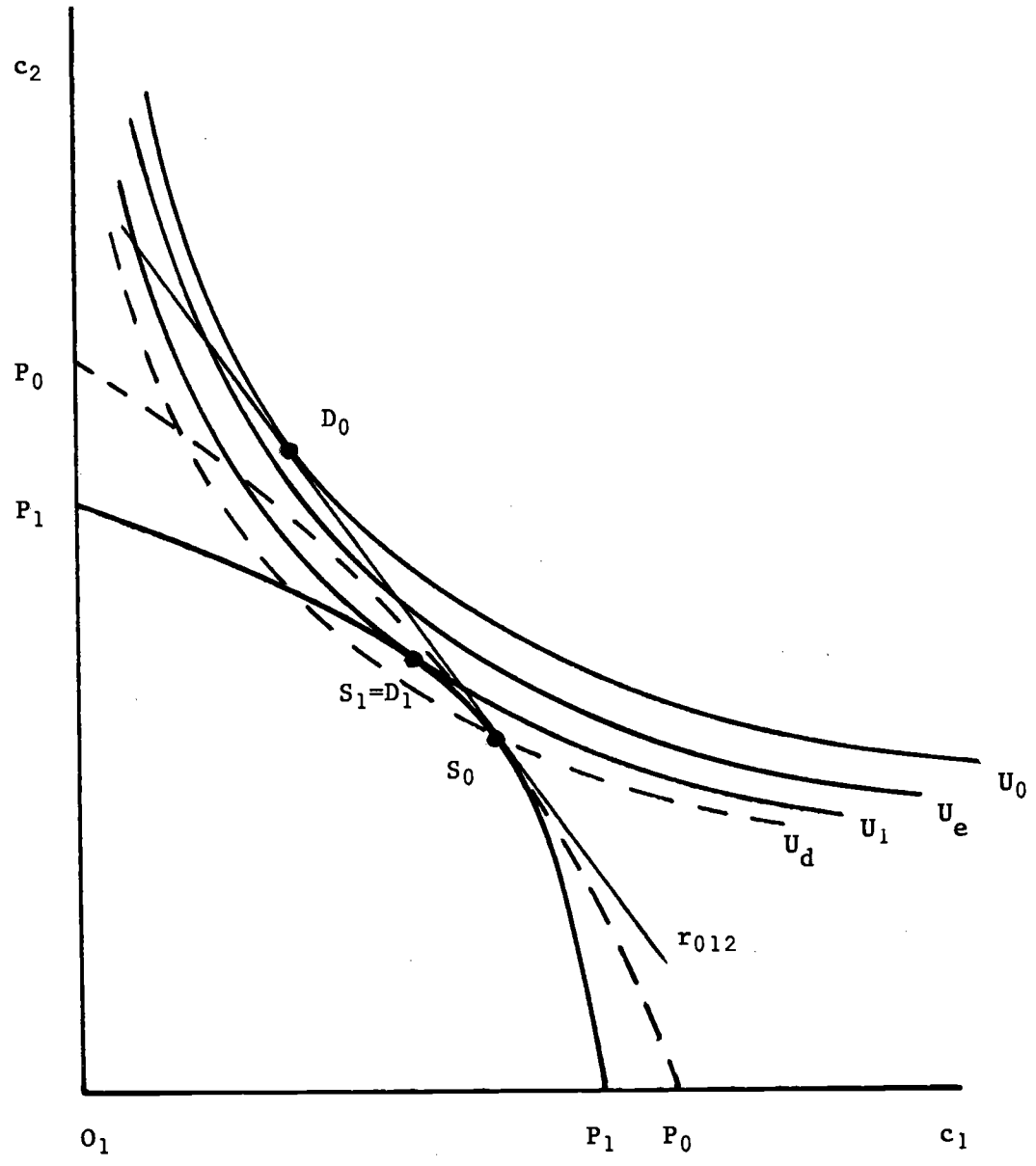

Figure 8

The welfare loss accompanying a recession. The representative participant anticipated utility level U_0 during t_0, but ends up with U_1 in t_1, instead of the level U_e attainable with equilibrium growth. (U_d pertains to consumption-displacing fiscal policy, to be discussed later.)

Although S_1 (equivalent to D_1) is technologically inefficient in terms of the production possibilities available at t_0 it provides higher welfare than S_0, since it is the highest utility point on P_1P_1. Therefore S_1 is the economically efficient production point for a recession that has materialized, even though it is technologically inefficient. It would be even better not to have had the recession in the first place, but by t_1 it is too late to prevent it. The best that can be done is to salvage utility level U_1 from the situation.[1] U_d, the utility level of S_0, is even lower than U_1.

A boom has the same welfare implications as a recession. As shown in Figure 9, an impending boom causes a sense of euphoria, with a planned utility level U_0 higher than the equilibrium level U_e. When the boom materializes, participants are stuck with a utility level U_1 that is lower than U_e and a fortiori lower than U_0.

We therefore arrive at the odd conclusion that a boom is as much a disappointment as a recession. It is true that as producers participants are pleasantly surprised by the briskness of demand. However, this benefit is more than offset by the deterioration of the terms on which they as consumers can buy that output. The financial side of this situation is that during t_0, the representative participant was planning to borrow at a low interest rate to finance additional consumption of c_1. When he gets to t_1, he finds that no one was planning to lend him this purchasing power, and the interest rate has to go up sufficiently high above r_{012} to discourage him from borrowing.

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[1] As in Mises' theory, we must regard the situation leading up to the recession as retrogression and the recession itself as progress (1963, 576).

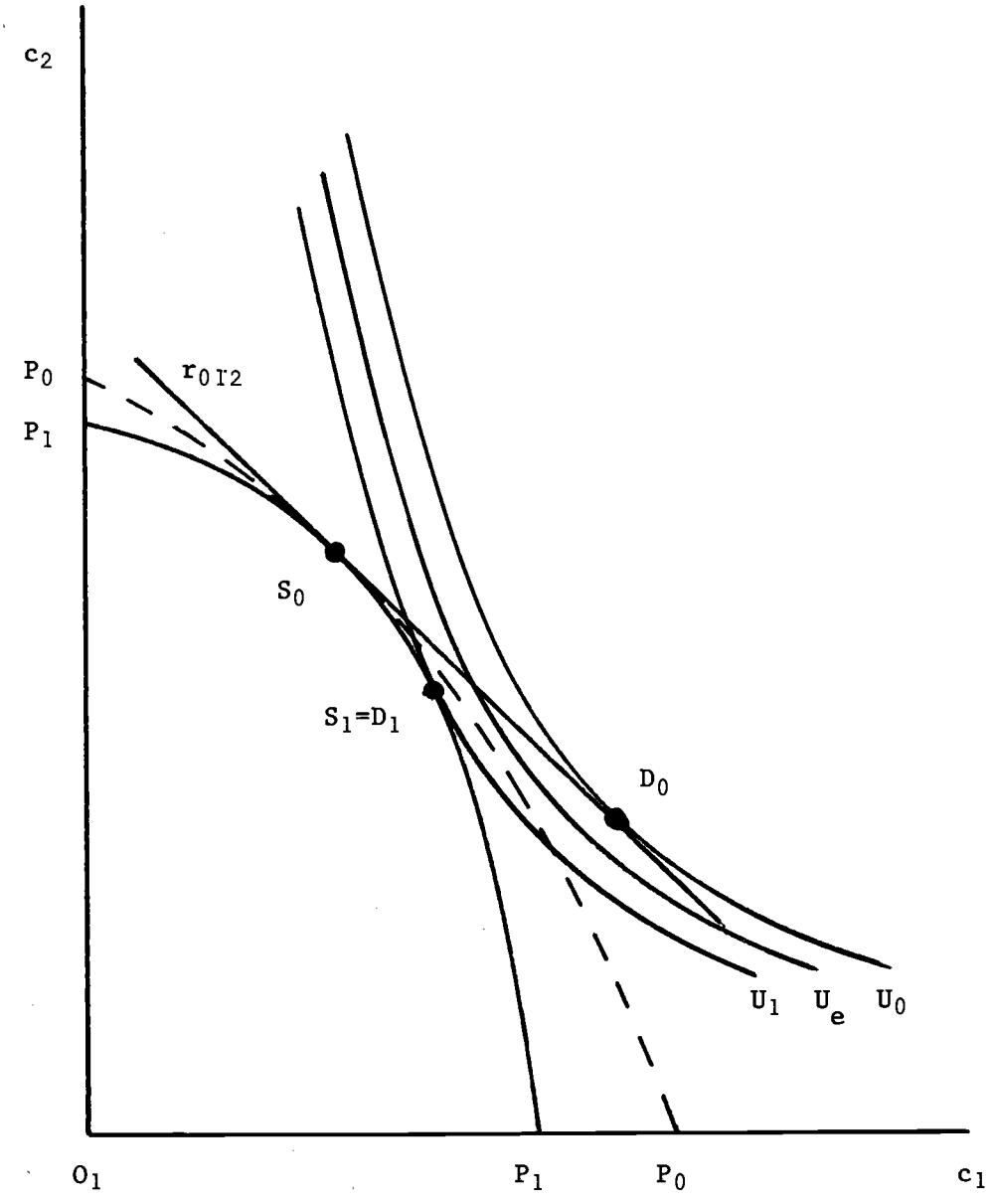

Figure 9

The welfare loss accompanying a boom. Again the representative participant suffers a disappointment from U_0 to U_1, and ends up with lower utility than the highest attainable, U_e.

The ability of misintermediation to raise the representative participant's pre-fluctuation planned utility from U_e to U_0 helps explain the historical survival power of misintermediation.[1] If misintermediation merely introduced uncertainty, without altering the utility of the expected consumption stream, risk aversion would have worked more powerfully against it over the centuries. However, it holds out the prospect of a consumption stream with higher utility than is attainable with balanced intermediation. The apparently improved utility of the mean is capable of outweighing the expected utility loss from the increased variance, or so it appears to participants during t_0. If the representative participant fully understood the economic implications of misintermediation, he would realize that if he does not precontract during t_0 all planned future borrowing and lending, interest rates will systematically move in the direction necessary to disappoint his plans. In practice, however, individuals' economic situations are so diverse and interest rate uncertainty such a small portion of total economic uncertainty that misintermediation fluctuations, while possibly the major component of aggregate fluctuations, are only a small component of each individual's changes in fortunes. Considering that most individuals do not even understand interest, let alone misintermediation, it is easy to see how they might completely lose sight of the systematic component in interest rate movements.

Misintermediation implies changes in interest rates that are systematic, but systematic only in the sense of being correlated with an unobserved variable, namely the production and consumption plans of the representative

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[1]This paragraph is in partial answer to a point raised by William Sharpe.

participant. It is true that everything necessary to construct this variable is "known" at t_0. However, this is not usable information, since its components are known to different individuals. By Hayek's principle of the "fragmentation of knowledge" (1973, 14), everyone is necessarily ignorant of almost everything that is known to anyone. Only if someone were to perform the superhuman task of putting everyone's plans together would this variable be observable.[1] In many cases, market prices allow individuals to use information known to other individuals without actually having to know that information themselves. In a hypothetical world in which balanced intermediation were not actively discouraged, the term structure of interest rates would serve that function by allowing individuals to coordinate their intertemporal production and consumption plans with those of other individuals without having to know what any of those other individuals is planning.

Money and Business Fluctuations

In the real world there is a strong correlation between fluctuations in the rate of monetary growth and fluctuations in the rate of growth of real output (Friedman and Schwartz, 1963). A completely exogenous fluctuation in the money supply could easily affect real output. One possible

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[1] It has been suggested that polls might provide information about the average individual's position. However, it is hard to believe that individuals would give as much attention to a questionnaire as they would to actual financial commitments. Furthermore, knowing whether a given sample of respondents is in fact representative is almost as difficult as knowing what financial position is representative. In any event, the fact that no such poll has ever been taken means that historically, at least, the representative participant's position has not been known, so there is no inconsistency if we posit the unavailability of this information to explain past fluctuations.

mechanism is through Walras' Law, which we used above with reference to the real intertemporal economy.[1] A monetary contraction, say, would lead to an excess demand for money, offset by an excess supply of real goods in general. This excess supply would last until deflation removed the excess demand for real cash balances.

Another possible mechanism works via the short-run Phillips Curve. The slowdown in the rate of inflation caused by a slowdown in the rate of monetary growth would ordinarily be largely unanticipated. Until inflation expectations caught up with the actual inflation rate, unemployment would be above the "natural" unemployment rate, and physical output would be below trend.

However, there is a mechanism by which misintermediation fluctuations could lead to disturbances in the money supply. The unanticipated rise in interest rates that accompanies a misintermediation boom would lead to unanticipated capital losses on any long-term securities or loans in the banks' portfolios. These losses will jeopardize the safety of the banks and make them more prone to failure in the event of runs. Therefore a misintermediation boom may lead to a banking crisis and monetary contraction followed by a deflationary depression. We would expect this phenomenon to have been particularly strong prior to the founding of the FDIC.

On the other hand, the unanticipated fall in interest rates that accompanies a misintermediation recession will lead to unanticipated capital gains on long-term assets. These gains will leave the banks in a good capital

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[1]This is the aspect of Walras' Law emphasized by Lange (1942).

position, from which they can safely launch a monetary expansion. Thus a misintermediation recession may end in a bank expansion and inflationary boom.

Furthermore, monetary instability can lead to conditions that permit the type of intertemporal disequilibrium we have discussed to appear, through the following mechanism: Monetary instability will tend to cause an erratic price level, so that participants will lose confidence in their ability to predict the future price level. For a given maturity, lenders would insist on a risk premium on nominal bonds above the effective real rate plus expected inflation. On the other hand, borrowers will insist on a nominal rate below the effective real rate plus expected inflation. The only way they will be able to agree on a nominal rate is for them to settle on a shorter maturity than corresponds to their actual dissavings and repayment plans.[1] In this manner, inflation uncertainty can break the link between financial instrument maturities and the dates of real consumption and production plans. Although intermediaries will not be the culprits, the same sort of fluctuations would occur.[2]

We therefore see monetary and misintermediation factors in business fluctuations as complementary and interrelated, rather than as mutually exclusive alternatives. However, we would expect the pure misintermediation

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[1]Brealey and Schaefer (1976) note the effect on lenders and conclude that inflation uncertainty leads to a liquidity premium. However, when the effect on borrowers is also considered, the only presumption that can be drawn is that maturities will be shortened.

[2]Purchasing power bonds would get around this problem, but they are not a viable alternative until Congress reverses the 1933 joint resolution against gold clauses. We are told by Cynthia Lichtenstein that on the basis of this resolution the courts interpret cost-of-living indexed bonds as contrary to public policy and therefore unenforceable. In a recent talk at MIT, Alan Blinder cited a recent instance of such a ruling in a Tennessee court. Variable rate loans are unsatisfactory substitutes for indexation, since they leave the real interest rate uncertain.

effect to be potentially much larger than the pure monetary effect, because of the magnitudes on which they operate. An intertemporal disequilibrium acts on the present discounted value of all future consumption (and production). A disequilibrium may be small as a percentage of this total and still involve enormous stakes. On the other hand, a monetary disturbance will involve only a fraction of the money supply, which in turn is only a fraction of just one year's consumption and production. The excess supply or demand for goods corresponding to an excess demand or supply of money will therefore be only a small fraction of the total demand for goods over time.

The power of banks to create money, whether in the form of checking accounts or old-fashioned circulating bank notes, is inextricably tied up with their habit of mismatching asset and liability maturities. Therefore balanced intermediation will require some changes in the monetary system. The new "liquid asset mutual funds" (on which large-denomination checks can now be drawn) and banks conforming to the old-fashioned "real bills doctrine" have desirable features in this respect, since they at least reduce the mismatching of maturities. One hundred percent reserve banking, which many have advocated, would permit completely balanced intermediation. However, it would preclude the efficiency gains from payment of interest on checking accounts (Johnson 1969, 31-37). We have not yet resolved in our own mind what the best way would be of integrating the monetary and intermediation systems.

Fiscal Policy

The conventional macroeconomic solution for a recession is increased government spending to absorb the excess supply of output. We now examine the welfare implications of such fiscal policy in the light of our model.

The increased government spending can take two extreme forms. It can either provide services consumers would have purchased anyway (consumption-displacing fiscal policy) or can consist entirely of wasteful make-work

projects to employ idle factors.[1]

If during a recession the government bought up the excess supply of current output and then gave this output back to the public without charge, it could induce participants to consume what they had originally planned to produce (S_0 in Figure 8). Doing this would require the government somehow to drive a wedge between the marginal rate of substitution and the marginal rate of transformation, in effect by taxation of c_2 and subsidization of c_1. The marginal rate of transformation between c_1 and c_2 would then be undisturbed from its t_0 anticipated value and no alterations of production plans or unanticipated changes in (before tax) factor incomes would be required for full employment. However, as was noted in the next-to-the-last section, the utility level U_d that would be achieved by this consumption-displacing fiscal policy is necessarily lower than U_1, the utility level that would be achieved by moving production as quickly as possible to S_1. (See Figure 8.) Therefore consumption-displacing fiscal policy actually aggravates the welfare loss caused by a misintermediation recession.

Keynes (1936, 128-131) argued that there is an advantage to expenditure that is wholly wasteful and therefore does not compete with what little demand there is for current output. As unemployed c_1-intensive factors are diverted into these make-work activities, the transformation curve between c_1 and c_2

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[1]It is sometimes assumed that the increased spending will be on "public goods" that consumers would not have purchased if left to themselves, but which do increase net consumer welfare. However, if there are any such goods, the government should not wait for a recession to provide them. We therefore assume that all desirable governmental public goods projects are undertaken with or without a recession, so that all deliberate counter-recessionary fiscal policy is either consumption-displacing or wasteful.

We also assume that all future tax liabilities are fully anticipated by the present (only) generation. Interesting consequences arise if they are not, but this issue is beyond the scope of the present paper.

will shrink as shown in Figure 10. The Rybczynski line RR is the locus of points at which the shrunken transformation curves have the same marginal rate of transformation as curve P_1P_1 (and P_0P_0) does at S_0.[1] At the point W along this line where this marginal rate of transformation equals the marginal rate of substitution in consumption, the unemployed factors will be just absorbed without any disturbance to anticipated interest rates or factor prices. Again, the realized utility level (U_w) with fiscal policy is necessarily lower than the level U_1 that would be attained in its absence.

While either sort of fiscal policy is worse, from the point of view of the representative participant, than no fiscal policy at all, it is not certain which will be the worse of the two. If the elasticity of substitution of the indifference curves[2] is high, so that they are relatively flat, the U_w indifference curve may pass beneath S_0 as shown in Figure 10, and the wasteful variety will be worse. On the other hand, if it is low, so that they are sharply bent, the U_w indifference curve may pass above S_0, and the consumption-displacing variety will be worse. Ironically, wasteful fiscal policy might actually be a lesser evil than consumption-displacing fiscal policy.

The utility level U_1 is the best that the market can possibly achieve, with instantaneous factor price adjustment and relocation. In practice,

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[1] See Johnson (1971, 35-39). Note that if tastes are homothetic, the point W can be constructed as the intersection of RR with the ray 0_1D_0 (not shown).

[2] From the standpoint of t_0, the relevant substitution elasticity is the "direct" elasticity which holds the quantity of c_0 constant.

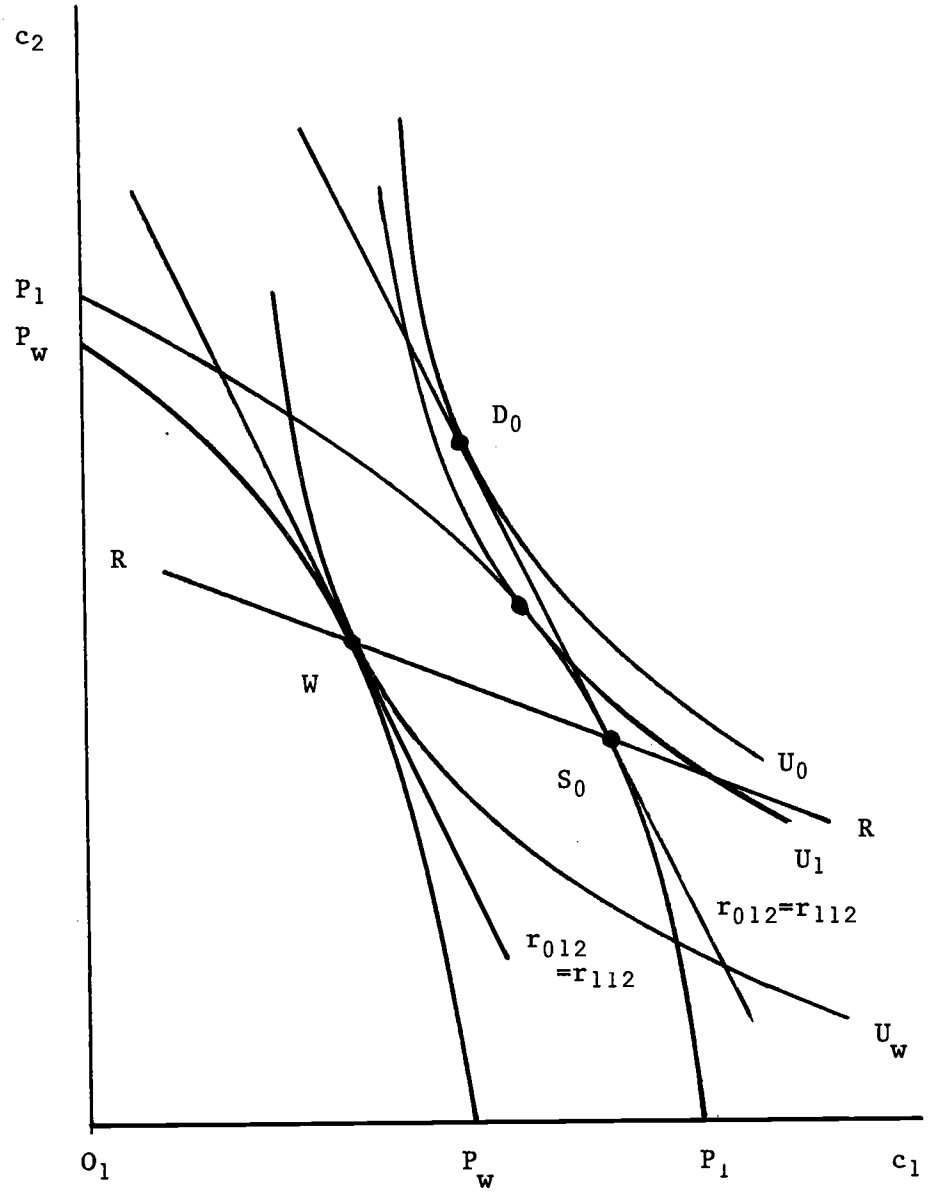

Figure 10

The welfare loss from wholly wasteful fiscal policy. Make-work employment of factors contracts the transformation curve from P_1P_1 to P_wP_w, where RR is a Rybczynski line. The representative participant achieves utility level U_w.

this adjustment will take time and there will be some output lost due to unemployed resources, so a utility level somewhat below U_1 will actually be attained without fiscal policy. Note, however, that the worst the market can do is not adjust factor prices at all, leaving the economy with welfare level U_w, the ideal welfare level from wasteful fiscal policy.

Fiscal policy will also take some time to implement, since the problem must be first recognized, then expenditure programs authorized, and finally these programs put into effect. To that extent, market adjustment will partially take place, so that fiscal policy will in practice achieve a welfare level somewhat above U_d or U_w.[1] However, if the fiscal policy somehow works instantaneously, say through the use of "automatic stabilizers", this gain will be lost.

Conclusion

In his General Theory, Keynes touched on many of the points we have raised in this paper. The following observation, for example, is reminiscent of what we have called the "Austrian Effect," and may indeed have been suggested by Keynes' exposure to Mises and Hayek:

> In optimum conditions..., production should be so organized as to produce in the most efficient manner compatible with delivery at the dates at which consumers' demand is expected to become effective. (215)

Clearly Keynes was aware of the fact that different production activities are necessary today in order to produce different shaped output streams efficiently.

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[1] This welfare gain is contingent on the fiscal program decided on being of a size appropriate to the excess supply that still exists when it goes into effect. There is a danger, however, that because of the recognition and implementation lags, it will instead be appropriate to the larger excess supply that existed when it was conceived, leading to the familiar problem of "destabilizing stabilization policy."

Consider also this passage relating to consumption:

> An act of individual saving means--so to speak--a decision not to have dinner to-day. But it does not necessitate a decision to have dinner or to buy a pair of boots a week hence or a year hence or to consume any specified thing at any specified date....
>
> If saving consisted not merely in abstaining from present consumption but in placing simultaneously a specific order for future consumption, the effect might indeed be different. (1936, 210)

We would have no quarrel at all with this statement if the word "commitment" were substituted for "decision". The whole essence of the misintermediation problem is that individuals' time-specific consumption decisions are not passed on to producers. Conceivably, consumption plans for the future might not be effectively time-specific, as would be the case if indifference curves between c_1 and c_2 were straight lines. Misintermediation fluctuations would not then be a problem, because consumers could be induced to consume exactly the stream producers were planning to produce with no unanticipated change in interest rates or welfare loss. However, the same considerations that lead us to expect diminishing marginal utility also lead us to expect that indifference curves will be curved away from the origin.[1] We therefore believe that consumption decisions, at least for the satisfaction of those wants that recur in each time period, do have an important time-specificity.

Although our model is in some sense Keynesian in that it builds on a few ideas Keynes would have agreed with, we strongly disagree with Keynes' crucial contention that saving "is not a substitution of future consumption-demand for present consumption-demand," but rather "a net diminution of such demand" (1936, 210).

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[1] See McCulloch and Smith (1976).

We have attempted to demonstrate that such an assumption is not necessary in order to explain the occasional appearance of an excess supply of all or almost all types of current output and factor services.

Perhaps the most significant conclusion to be drawn from our model is that counter-recessionary fiscal policy, even (or particularly) when it achieves its goal of full employment, actually aggravates the welfare loss accompanying a misintermediation recession. We therefore regard Keynes' best-remembered policy recommendation, which constitutes the core of macroeconomic teaching today, as being in fact detrimental to economic welfare.

MATHEMATICAL APPENDIX

The assertion made in the text that there will be a planned excess supply of c_1 if and only if the forward rate r_{012} is too high seems obvious. However, the possibility that the c_0 component of S_0 and D_0 will not equal that of the equilibrium stream makes the proof a little more difficult than it would otherwise be, even in a world which may be characterized by our representative participants.

Let the row vectors $\delta = (1, \delta_{001}, \delta_{002})$ and $\delta^e = (1, \delta_{001}{}^e, \delta_{002}{}^e)$ be the actual and equilibrium intertemporal price vectors for t_0.

Let $d = (d_0, d_1, d_2)^T$ and $s = (s_0, s_1, s_2)^T$ be column vectors representing the disequilibrium planned demand and supply streams represented in the figures by points D_0 and S_0, so that $d_0 = s_0$. Let $s^e = (s_0{}^e, s_1{}^e, s_2{}^e)^T$ represent the equilibrium stream, for which supply and demand plans coincide. Let $c = (c_0, c_1, c_2)^T$ be an arbitrary stream of consumption goods.

The equilibrium budget plane is the set of points c for which

$$\delta^e(c - s^e) = 0 . \qquad \text{A1)}$$

The set of points on the origin side of this plane is given by

$$\delta^e(c - s^e) < 0 . \qquad \text{A2)}$$

Except for s^e, the whole production possibilities set lies on the origin side of this plane. Since s is a member of this set different from s^e, we have

$$\delta^e(s - s^e) < 0 \ . \qquad \text{A3)}$$

The actual disequilibrium budget plane is given by the set of points c, such that

$$\delta(c - s) = 0 \ . \qquad \text{A4)}$$

Point d lies on this plane, and $d_0 = s_0$, so we have

$$0 = (1, \delta_{001}, \delta_{002})(d - s) \qquad \text{A5)}$$

$$= (0, \delta_{001}, \delta_{002})(d - s) \qquad \text{A6)}$$

$$= (0, 1, \delta_{012})(d - s) \ . \qquad \text{A7)}$$

Suppose, contrary to the assertion we are trying to prove, that $d_1 > s_1$ and $d_2 < s_2$ even though $r_{012} > r_{012}^e$ (and therefore $\delta_{012} < \delta_{012}^e$). It would then follow from A7) that

$$(0, 1, \delta_{012}^e)(d - s) < 0 \qquad \text{A8)}$$

$$(0, \delta_{001}^e, \delta_{002}^e)(d - s) < 0 \qquad \text{A9)}$$

$$(1, \delta_{001}^e, \delta_{002}^e)(d - s) < 0 \ . \qquad \text{A10)}$$

Adding A3) and A10), we have

$$\delta^e(d - s^e) < 0 \ , \qquad \text{A11)}$$

so that d must lie on the origin side of the equilibrium budget plane.

Since our representative participant would select point s^e from the equilibrium budget plane, s^e must be preferred to any point below this plane, and therefore to d. However, s^e, being in the production possibilities set, is on the origin side of the disequilibrium budget plane, so we may also conclude that d (which the average participant selects from this plane) is preferred to s^e. This contradiction of the axioms of revealed preference completes our proof that $d_1 < s_1$ whenever $r_{012} > r_{012}^e$.

The above theorem is valid no matter how far we are from equilibrium. Some additional propositions of interest may be proven, but only for small deviations from equilibrium. Let "E" represent the logarithmic differentiation operator, defined for any variable x by

$$Ex = dx/x = d(\ln x) \ . \qquad \text{A12)}$$

Define k_i to be the share of i-th period consumption in the equilibrium budget:

$$k_i = \delta_{00i}^e \ s_i^e/(s_0^e + \delta_{001}^e \ s_1^e + \delta_{002}^e \ s_2^e) \ . \qquad \text{A13)}$$

Let σ_{ij} and τ_{ij} respectively be the Allen elasticities of substitution in consumption, and of transformation in production. We must always have

$$\sigma_{ij} = \sigma_{ji} \ , \qquad \text{A14)}$$

$$\tau_{ij} = \tau_{ji} \ , \qquad \text{A15)}$$

$$\sum_{i=0}^{2} k_i \sigma_{ij} = 0 \ , \qquad \text{A16)}$$

and

$$\sum_{i=0}^{2} k_i \tau_{ij} = 0 \ . \qquad \text{A17)}$$

Convexity towards the origin of the indifference surfaces implies that $\sigma_{ii} < 0$. Because of A16), we will therefore usually, but not necessarily always, have

$$\sigma_{ij} > 0 \ , \ i \neq j \ \text{(usually)} \ . \qquad \text{A18)}$$

We will define the sign of τ_{ij} so that convexity of the transformation surface away from the origin likewise implies that $\tau_{ii} < 0$. We then will have

$$\tau_{ij} > 0 \ , \ i \neq j \ \text{(usually)} \ . \qquad \text{A19)}$$

For a utility maximizing individual, the σ_{ij} have the property that

$$Ed_i = k_j \sigma_{ij} E\delta_{00j} \ , \qquad \text{A20)}$$

if utility and prices other than δ_{00j} are held constant. Similarly, the τ_{ij} have the property that

$$Es_i = -k_j \tau_{ij} E\delta_{00j} \qquad \text{A21)}$$

for movements along the transformation surface keeping the value of output maximized and holding other prices constant. For small movements from equilibrium, for which income effects are negligible, and using c_0 as numeraire, we will therefore have

$$Es_i = -k_1\tau_{1i}E\delta_{001} - k_2\tau_{2i}E\delta_{002} \ , \ i = 0, 1, 2 \qquad A22)$$

and

$$Ed_i = k_1\sigma_{1i}E\delta_{001} + k_2\sigma_{2i}E\delta_{002} \ , \ i = 0, 1, 2 \ . \qquad A23)$$

Because the market for current (t_0) output must clear, we have

$$Es_0 = Ed_0 \ . \qquad A24)$$

We have seven equations and eight unknowns. We are therefore left with the one degree of freedom inherent in the 3-period world. Solving equations A22)-A24) in terms of $E\delta_{012}$ ($=E\delta_{002} - E\delta_{001}$) gives

$$E\delta_{001} = \frac{k_2(\sigma_{02} + \tau_{02})}{k_0(\tau_{00} + \sigma_{00})} E\delta_{012} \qquad A25)$$

$$E\delta_{002} = \frac{-k_1(\sigma_{01} + \tau_{01})}{k_0(\tau_{00} + \sigma_{00})} E\delta_{012} \qquad A26)$$

$$Es_0 = Ed_0 = \frac{k_1k_2(\sigma_{01}\tau_{02} - \sigma_{02}\tau_{01})}{k_0(\tau_{00} + \sigma_{00})} E\delta_{012} \ . \qquad A27)$$

In order to get A25) through A27) in terms of interest rates, we must differentiate (2) through (4) in the text:

$$E\delta_{001} = -(t_1 - t_0)dr_{001} \qquad \text{A28)}$$

$$E\delta_{002} = -(t_2 - t_0)dr_{002} \qquad \text{A29)}$$

$$E\delta_{012} = -(t_2 - t_1)dr_{012} \qquad \text{A30)}$$

Substituting A28) through A30) into A25) through A27),

$$dr_{001} = \frac{(t_2 - t_1)k_2(\sigma_{02} + \tau_{02})}{(t_1 - t_0)k_0(\tau_{00} + \sigma_{00})} dr_{012} \qquad \text{A31)}$$

$$dr_{002} = \frac{-(t_2 - t_1)k_1(\sigma_{01} + \tau_{01})}{(t_2 - t_0)k_0(\tau_{00} + \sigma_{00})} dr_{012} \qquad \text{A32)}$$

$$Es_0 = Ed_0 = \frac{(t_2 - t_1)k_1k_2(\sigma_{02}\tau_{01} - \sigma_{01}\tau_{02})}{k_0(\tau_{00} + \sigma_{00})} dr_{012} \qquad \text{A33)}$$

The denominators of A31) - A33) are always negative by the convexity conditions on σ_{ii} and τ_{ii}. The numerators of A31) and A32) are usually (though not necessarily) positive and negative respectively. The numerator of A33) may be of either sign, but there is a weak presumption as to its sign. If c_0, c_1, and c_2 enter preferences symmetrically, we would expect $\sigma_{01} \approx \sigma_{02}$. However, by arguments related to those used to support the Austrian effect, we might expect to find $\tau_{01} < \tau_{02}$, making the numerator of A33) negative. We therefore make the following generalizations:

$$\frac{dr_{001}}{dr_{012}} < 0 \text{ (usually)} , \qquad \text{A34)}$$

$$\frac{dr_{002}}{dr_{012}} > 0 \text{ (usually)} \qquad \text{A35)}$$

and

$$\frac{Es_0}{dr_{012}} = \frac{Ed_0}{dr_{012}} > 0 \text{ (weak presumption)} . \qquad \text{A36)}$$

A34) and A35) show that disequilibrium cannot be associated with too high or too low a general level of yields to maturity during the prefluctuation period. Some will be too high and some too low. Rather, an impending recession ($dr_{012} > 0$) means that the t_0 yield curve is either insufficiently downward sloping or excessively upward sloping, being too low at the short end and too high at the long end. The opposite is true for an impending boom.

A36) indicates that t_0 consumption and production have a slight tendency to be higher than their equilibrium value for a recession and lower for a boom, provided the disequilibrium is small. Intuitively, the limited transformation opportunities between c_0 and c_1 tend to pull c_0 in the same direction as c_1. For large disequilibria, income effects will begin to be important. Since U_0 lies above U_e for both booms and recessions, income effects will be positive if, as is natural to assume, no period's consumption is inferior, and ignoring distribution effects. Therefore, if the disequilibrium is sufficiently large, and $\sigma_{01}\tau_{02}$ sufficiently close to $\sigma_{02}\tau_{01}$, we would expect to find consumption and production of c_0 above its equilibrium value in either case.

REFERENCES

Böhm-Bawerk, Eugen von. Capital and Interest (South Holland, Ill.: Libertarian Press, 1959) Translation of German 4th edition (1914).

Brealey, Richard and Stephen Schaefer. "Term Structure with Uncertain Inflation," unpublished paper presented at the American Economics Association meetings, Atlantic City, September 1976.

Darby, Michael R. "Three-and-a-Half Million U.S. Employees Have Been Mislaid: Or, an Explanation of Unemployment, 1934-1941." Journal of Political Economy 84 (Feb. 1976), 1-16.

de Roover, Raymond. "New Interpretations of the History of Banking," Journal of World History 2:38-76 (1954).

_____. The Rise and Decline of the Medici Bank 1397-1494 (Cambridge: Harvard University Press, 1963).

Dicey, A.V. Law and Public Opinion in England During the Nineteenth Century, second edition, (London: MacMillan, 1963). Originally 1914.

Fisher, Irving. "Our Unstable Dollar and the So-Called Business Cycle," Journal of the American Statistical Association 20 (June 1925), pp. 179-202.

Friedman, Milton. "Discussion of the Inflationary Gap," American Economic Review 32 (June, 1942), 314-20. Reprinted in Friedman, Essays in Positive Economics (Chicago: University of Chicago Press, 1953).

Friedman, Milton and Anna J. Schwartz. "Money and Business Cycles," Review of Economics and Statistics 45 (February, 1963), reprinted in Friedman, ed., The Optimum Quantity of Money and Other Essays, (Chicago: Aldine, 1969).

Galbraith, John Kenneth. The Great Crash: 1929 (Boston: Houghton Mifflin, 1955).

Georgescu-Roegen, Nicholas. "The Aggregate Linear Production Function and its Applications to von Newmann's Economic Model," in T.C. Koopmans, ed., Activity Analysis of Production and Allocation (New York: Wiley, 1951).

Gurley, John G. and Edward S. Shaw. Money in a Theory of Finance (Washington: Brookings, 1960).

Hansen, Alvin H. Business Cycles and National Income (New York: Norton, 1951).

Hayek, F.A. Law, Legislation and Liberty. (Chicago: University of Chicago Press, 1973), Vol. I.

Hirschleifer, J. Investment, Interest, and Capital (Englewood Cliffs, N.J.: Prentice-Hall, 1970).

Hunt, Reed O., chairman. The Report of the President's Commission on Financial Structure and Regulation (Washington: GPO, 1972).

Johnson, Harry G. "Inside Money, Outside Money, Income, Wealth, and Welfare in Monetary Theory," Journal of Money, Credit and Banking 1 (February 1969), 30-45.

_____. The Two-Sector Model of General Equilibrium (Chicago: Aldine, 1971).

_____. "The American Tradition in Economics," forthcoming in American Economic Review (Proceedings), May 1977.

Keynes, John Maynard. "Alternative Aims in Monetary Policy," in Keynes, Essays in Persuasion (New York: Harcourt, Brace and Company, 1932). Originally published 1923.

_____. The General Theory of Employment, Interest and Money (New York: Harcourt Brace & World, Inc., [1936]).

Kindleberger, Charles P. The World in Depression, 1929-39. (London: Allen Lane, The Penguin Press, 1973).

Klebaner, Benjamin J. Commercial Banking in the United States: A History (Kinsdale, Illinois: Dryden, 1974).

Klein, Lawrence R. The Keynesian Revolution, second edition (New York: MacMillan, 1966).

Lachmann, L.M. "Sir John Hicks on Capital and Growth," The South African Journal of Economics 34 (June 1966), 113-123.

Lange, Oskar. "Say's Law: A Restatement and Criticism," in Lange, McIntyre and Yntema, eds., Studies in Mathematical Economics and Econometrics, in Memory of Henry Schultz. (Chicago, 1942).

Lapidus, L., S. Cutler, P. P. Kildoyle and A. L. Castro. Public Policy Toward Mutual Savings Banks in New York State: Proposals for Change (New York: Federal Reserve Bank of New York and New York State Banking Department, 1974.)

Liviatan, Nissan. "Multiperiod Future Consumption as an Aggregate," American Economic Review 56 (Sept. 1966), 828-840.

Maine, Sir Henry. Ancient Law. (London: Everyman's Library, 1960). Originally published 1861.

McCulloch, J. Huston. "Measuring the Term Structure of Interest Rates," Journal of Business 44(1): 19-31 (Jan., 1971).

_____. "The Tax-Adjusted Yield Curve," Journal of Finance 30 (June, 1975), 811-830. [1975a]

_____. "The Monte Carlo Cycle in Business Activity," Economic Inquiry 13 (Sept. 1975) 303-321. [1975b]

_____ and Jeffrey D. Smith. "An Austrian Proof of Quasi-Concave Preferences," Boston College Discussion Paper #70 (unpublished), revised April 1976. Submitted to Econometrica.

Merchant, A. "The Mystery of the New Fashioned Goldsmiths or Bankers," (c. 1676), reprinted in Quarterly Journal of Economics (Jan. 1888), 250-62.

Phelps, E.S., ed. Microfoundations of Inflation and Employment Theory, (New York: Norton, 1970).

Rothbard, Murray N. America's Great Depression, (New York: Van Nostrand, 1963).

Rothschild, Michael. "Models of Market Organization with Imperfect Information," Journal of Political Economy 81 (Nov./Dec. 1973) 1283-1308.

Stein, Herbert. "Pre-Revolutionary Fiscal Policy: The Regime of Herbert Hoover," Journal of Law and Economics 9:189-223 (Oct., 1966).

Stigler, George. "The Economics of Information," Journal of Political Economy 69 (June 1961): 213-25.

Stiglitz, Joseph E. "A Consumption-Oriented Theory of the Demand for Financial Assets and the Term Structure of Interest Rates," Review of Economic Studies 37: 321-51 (July 1970).

Tobin, James. "Deposit Interest Ceilings as a Monetary Control," Journal of Money, Credit and Banking 2 (Feb. 1970) 4-14.

von Mises, Ludwig. The Theory of Money and Credit, New Edition. (New Haven: Yale University Press, 1953). Pages 1-410 a translation of the 1924 German edition.

Wille, Frank. "FDIC 1975: Source of Strength within the American Banking System," (Washington: FDIC, 1975).