

A Model of Depression *

I. Introduction

Given that depression is the most glaring and costly form of resource misallocation,¹ there is something perverse in the failure of economists to have generated a consensus model of depression. Kindleberger (1978, p. 23) suggests that modern macroeconomic theory is incomplete because it omits serious instability. This paper offers such a model.² The endeavor is not without current relevance if it is deemed that a decentralized, capitalist economic system has a tendency to become steadily more vulnerable to the possibility of depression over time and that the global economy currently exhibits symptoms of such vulnerability (see Section V below).

Cognitive psychology offers a theory (the availability heuristic), which suggests that as an event becomes less easily recalled, the subjective probability assigned to that event diminishes and, when it reaches the "threshold level", falls to zero.³ This behavior, possibly

* The author is professor of economics and management, Rensselaer Polytechnic Institute. The model owes an obvious debt to the writings of Charles P. Kindleberger, Jan Kregel, Axel Leijonhufvud and Hyman P. Minsky as well as to Jean M. Gray. The author gratefully acknowledges comments on an earlier draft from Kregel and William S. Milberg.

¹ In addition to the obvious human costs, there are also efficiency costs if restrictive clauses in labor contracts which prevented management from crossing jurisdictional lines, may be attributed to the acute shortage of jobs during the depression between the two world wars. These costs survived long after the end of the 1930s depression.

² The paper uses the distinction between a model which is abstract and a theory which is a model which has survived empirical test. The model produced here will also satisfy SIR ARTHUR EDDINGTON's assertion that "It is also a good rule not to put overmuch confidence in the observational results that are put forward until they are confirmed by theory [a model]" (1935, p. 211). See also the citation from Alfred Marshall in FRIEDMAN and SCHWARTZ (1963, p. xix).

³ For an economic application of this apparatus to sovereign risk exposure by commercial banks, see GUTTENTAG and HERRING (1986, pp. 3-4). The availability heuristic is a useful device for assessing frequency but the process is subject to bias and does not allow for differences in the importance of individual events (see TVERSKY and

together with Samuelson's explanation of the Great Depression as a combination of accidents (Kindleberger, 1973, p. 19-21), may explain the seeming lack of concern with the generation of a model of depression. A second possible explanation is that economic analysis has placed undue emphasis on flow equilibria with the often implicit assumption that a *full stock-flow equilibrium* will be achieved, and has tended to neglect any stock imbalances (particularly so when the effects of the latter are subject to prolonged suppression). A final possible explanation is that the likelihood of depression was, until quite recently, very small: the global system retained large amounts of "stability efficiency" from the post-war era.⁴

Define depression as a major and protracted underutilization of resources with no quick-acting tendency on the part of normal equilibrating forces to push the economy back to acceptable or normal levels of capacity utilization.⁵ Depression is, then, caused by a lack of aggregate demand and not by "wage-stickiness": this causality conforms to Keynes' thinking (Means, 1976). There are then two dimensions to the existence of depression: first, the cause of extremely low levels of capacity utilization or of effective aggregate demand; and second, the failure of the economy spontaneously to generate wellsprings of aggregate demand in addition to those which are income-generated, to restore an acceptably high level of capacity utilization.⁶ An extremely low level of capacity utilization has two possible causes (the bang and the whimper respectively): first, some large adverse disturbance or shock may push the economy into a low level of capacity utilization; and second, the economic system may simply collapse under its own weight as a result of a lack of resistance to depression (in other words a prolonged and deep recession could change into a depression). The two causes are interrelated in the sense that the weaker the economy (the less its stability-efficiency), the smaller is the shock needed to push the economy into depression.

KAHNEMAN, 1982, pp. 11-4). Clearly, the availability heuristic is strengthened in context when generations change and those who lived through an experience die out or retire: this is the "scar-tissue" effect of depression considered in Section IV.

⁴ "Stability efficiency" can be defined as those characteristics of an economy which prevent it from sliding into a depression (GRAY and GRAY, 1981, pp. 57-61). The concept is developed in Section III.

⁵ A recession is, then, self-correcting though the time required for this process may be unduly long and can possibly be shortened by intelligent macroeconomic policy. A recession would, then, be part and parcel of a normal trade or business cycle.

⁶ KINDLEBERGER makes this distinction (1973, pp. 25-6).

Much of the emphasis of this paper is on the forces contributing to the degree of stability efficiency which exists in an economy (or, conversely, on the degree of vulnerability to depression in the event of an adverse shock of given magnitude), and on how stability efficiency can be enhanced by natural forces or by policy measures.⁷ The model of depression to be developed here is, then, a model of vulnerability to depression: some sufficiently large shock or trigger is still required if depression is to occur. The question is what determines the ability of an economy to withstand shock whether the source be political or economic.⁸

Section II summarizes Leijonhufvud's (1973) model of macroeconomic instability, examines its *lacunae* and builds on that model to create a richer analytic framework of depression and stability efficiency.⁹ Section III examines the concept of stability efficiency and its determinants as well as the complex role of financial crises in contributing to depression. Section IV confronts the question of why the depressed economy does not spontaneously revert to satisfactory levels of capacity utilization within a short (but by no means instantaneous) period of time. Section V considers the current state of the global economy in terms of the model. Section VI summarizes the argument.

II. A model of macroeconomic instability

The most insightful analytic model of depression is Leijonhufvud's theory of a corridor of well-coordinated markets bounded by domains of depression and hyperinflation which are not automatically self-

⁷ There may be a tendency for stability efficiency to wane with the passage of time – a built-in macroeconomic entropy. Unlike physical entropy, macroeconomic entropy can be reversed by periods in which stability efficiency is recreated.

⁸ This puts the desirability of stability-enhancing policy measures into an "insurance" framework – incurring a known cost against the (low) probability of a large misadventure.

⁹ Both Leijonhufvud and this paper offer models which comprise a normal domain of stability or well-co-ordinated behavior bounded on either side by ranges of nominal national income in which economic behavior is structurally different. Both papers neglect development of the hyperinflation region although it is quite possible that the model developed in this paper will have some value in explaining hyperinflation. The model will explain why escape from the region or domain of hyperinflation almost inevitably generates a depression: because the hyperinflation will have eliminated virtually all sources of stability efficiency in the economy.

correcting (1973).¹⁰ This model conceives of an economy as suffering from structural shifts (changing domains) at certain levels of national income so that there exists only a finite and not necessarily constant, range of rates of output over which any unidomain model of macroeconomic behavior is applicable. The movement from one domain to another (instability) changes the coefficients of the set of equations which characterize the economy without requiring a different set of equations: re-entry into the normal domain will result in something close to the set of equations and coefficients which characterized the economy before it lapsed from normalcy except for the effects of any changes in institutions or behavior which will have occurred during the period of depression (particularly the lasting effects of the experience of depression on people's confidence and expectations). This is the crux of Leijonhufvud's model. Within the corridor, well coordinated markets provide strong homeostatic mechanisms which direct the economy back towards its long-run growth path after minor dislocations: if some demand-reducing shock of sufficient magnitude pushes the economy beyond the corridor, then the economy lapses into depression and has negligible self-correcting forces to restore high levels of capacity utilization. Leijonhufvud (1973, pp. 31-2) contrasts his corridor of a limited range of self-correcting mechanisms with the neoclassical model which assumes strong corrective mechanisms over the feasible range of national incomes and with the Keynesian system which has no self-correcting forces and in which all expenditures are income-generated so that

¹⁰ There is no suggestion that the summary of Leijonhufvud's article presented here does justice to the creative insights: for that, see the original. Leijonhufvud is concerned with economic behavior within the domains and eschews the concept of instability: this paper defines instability as the passage from the normal or well co-ordinated domain to the depression domain. While the depression domain does not respond easily or quickly to policy measures, hyperinflation can be effectively cured by reducing the rate of growth of the money supply. Since both phenomena can continue for protracted periods, it is misleading to describe either of these domains as "disequilibrium" or "unstable".

Leijonhufvud does not explain the width of the corridor, nor is there any reason to suppose that the width is in any way fixed through time. If, as is set out below, the position of the lefthand corridor wall is determined by that point at which stability-efficiency disappears and depression sets in, then the position of the wall will vary according to the strength of the existing individual forces contributing to stability efficiency: probably the most obvious such force is the degree of financial leverage or gearing which characterizes the national economy. In view of the recent surge of widespread insolvencies of deposit intermediaries in the United States and of junk bonds in both Europe and the United States, the corridor may be seen as narrowing in the late twentieth century.

actual levels of capacity utilization will be determined with nearly equal probability all of the way from very deep depression to full employment.

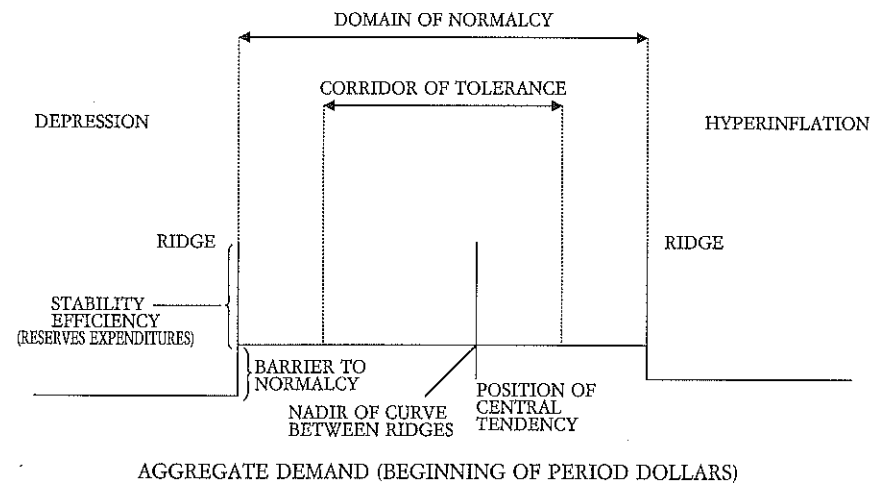
The essence of the servomechanisms is buffer stocks of cash at the disposal of households: these can be used to moderate the effects of changes in national and disposable income on consumption expenditures and therefore to moderate the variability of effective aggregate demand by dampening the simple multiplier reaction. In other words, buffer stocks of cash permit consumers to add to aggregate demand without drawing on income-generated funds. Once buffer stocks become exhausted in the face of "unanticipatedly large" [adverse] disturbances or shocks, income-driven relationships (multipliers) become operative and the economy can be pushed into depression by an adverse shock (Leijonhufvud, 1973, p. 39). Leijonhufvud's concern is mainly to establish the existence of multiple domains and to provide an explanation of some of the facts that dispute both simple neoclassicism and simple Keynesianism within the normal domain. A full theory of depression must:

- i) provide an explanation of the innate degree of resistance to depression (what might be called the strength of Leijonhufvud's corridor wall);
- ii) provide an explanation for the possibility of a sudden onset of depression as well as of a gradual weakening of the economy which will then slide into depression with a whimper;
- iii) incorporate the role of financial crisis;
- iv) show why an economy remains in depression and does not revert back to the domain of normalcy except, presumably, through some favorable disturbance or policy measure.

Consider an economy whose stability features can be described in terms of Figure 1. The Figure measures national income in current dollars horizontally but the position of particular points on the graph are revalued for each succeeding period so that only current-period changes in the price level are incorporated into the diagram.¹¹ National income increases from depression on the left to hyperinflation on the right: there exists a point of central tendency

¹¹ This device of measuring national income in current dollars adjusted for all inflation except that in the current period, makes the figure compatible with a period-analysis framework.

FIGURE 1



(PCT) which identifies the current value of national income on the long-run growth path.¹² The domain of normalcy lies between the twin ridges of stability efficiency: the lefthand ridge shows the maximum amount of stabilizing expenditures which will be generated per period in the face of a decline in aggregate demand: (stabilizing expenditures in recession are those expenditures which find their source in something other than current income and which run counter to departures from PCT – see below). The corridor of tolerance is a political construct showing what range of national income will be accepted by the electorate without serious political pressure building up on the incumbent government. Future periods lie ahead the past lies behind. The slope of the heavy line shows the incremental resistance to a shock-induced change in the level of national income away from PCT – *i.e.* the strength of the

¹² The position of PCT within the domain of normalcy depends upon factors contributing to economic growth including such variables as the structure of taxes, rates of technological innovation, rates of foreign direct investment and financial inflows, and saving rates.

servomechanisms – and the height of the ridges shows the total resistance (expenditure changes unrelated to current income) to a change of domain. According to Leijonhufvud's characterizations, the neoclassical model would show a very tall and steep V-shaped profile around PCT while the Keynesian system would be flat. On either side of the ridges levels of aggregate demand fade off into different domains in which there is no servomechanism to restore the economy to the domain of normalcy (towards PCT). Indeed, the Figure shows there to be a barrier to re-entry into the normal domain (even when the ridges have been effectively eroded) because the level in the depression domain lies below that in the normal domain: this barrier will increase with time in the depression domain and with the need for economic units to rebuild minimal net worths and cash balances prior to reverting to normal income-related rates of spending. Stability forces are normally such that small variations around the PCT occur quite easily but, as the economy is pushed further from the PCT, the servomechanisms become stronger (this is compatible with Leijonhufvud's model).¹³ At the beginning of each period, the economy inherits a certain amount of stability efficiency and, if the level of capacity utilization is not that indicated by the PCT, uses up some of its stability efficiency during the period: the curve shifts downward and the height of the ridge is reduced. Small deviations from PCT have little effect on the stock of stability efficiency. Should a shock occur during the period, the economy will be forced into depression if the shock is big enough to overcome the existing stock of stability efficiency. There is a danger that the smaller the stock of stability efficiency, the greater is the likelihood of a financial shock and of stability-efficiency eroding financial conditions.

A satisfactory theory of depression must identify both those factors which contribute to stability efficiency (Section III) and those which will lock the economy into the depression domain (Section IV).

¹³ A possible variant is for the Figure to have an S-shaped curve between PCT and the lefthand ridge (with the second derivative negative as the lefthand ridge is approached as stabilizing investment dries up more quickly than stabilizing consumption expenditures). The role of active monetary and fiscal policy in recession is both to change the shape of the curve and to shift it up. The curve, then, is defined in terms of an institutional setting and in terms of a prescribed set of policy reactions. Any factors which limit the strength of policy reactions, redefine the curve and shift it down. This is important now when the scope of monetary policy in the United States is limited by the need to maintain the existing stock of foreign saving in dollar-denominated assets and when expansionary fiscal policy would build on an already huge federal deficit.

III. Sources of stability efficiency

The essential source of stability efficiency in a recession is the willingness and the ability of economic units to increase spending when income is below its PCT.¹⁴ Such spending has three basic sources: a willingness by business to spend when the real cost of borrowed funds drops in a recession (stabilizing investment); a willingness by households to spend out of net worth (liquid balances) when disposable income falls below normal levels of consumption;¹⁵ and a willingness by foreigners to allow the country to increase its international balance on goods and non-factor services.¹⁶

Investment expenditures which contribute to stability efficiency can be seen in terms of the degree to which expenditures induced by the natural or policy-induced procyclical fall in real interest rates in a recession exceed income-induced declines in investment: this, in turn, depends upon expectations of the future behavior of the macroeconomy and upon the elasticity of investment expenditures with respect to the rate of interest. It follows that those who presume the investment schedule to be interest inelastic will disregard this source of stability efficiency, and those who regard the investment schedule to be highly elastic with respect to the rate of interest and not subject to serious shifts, will believe in the inherent stability of the system. As will be shown in Section IV, the interest-elasticity of investment expenditures with respect to the rate of interest is likely to depend upon the expectations of the spenders and, therefore, on the domain in which the economy is positioned. (Investment will be interest-elastic within the normal domain and inelastic in depression).

The second source of stability efficiency is consumption expenditures, which are financed by decreases in net worth.¹⁷ Households are

¹⁴ This is fully compatible with Leijonhufvud's model.

¹⁵ Stabilizing consumption is that expenditure which supplements normal consumption spending out of income. While the underlying mechanics of the three sources are detailed separately, there is some degree of overlap of causes – in other words, corporations must have or be able to raise any needed equity and household expenditures could have some interest-sensitivity.

¹⁶ This source of aggregate demand indicates that escape from a depression by a single country in a prosperous (and non-protectionist) world will be much simpler than in a global depression.

¹⁷ Here the amount of income consisting of government transfers (built-in stabilizers) is considered part of the flow of current household income and contributes to stability efficiency in that way. These consumption expenditures are the ones which Leijonhufvud saw as being financed out of buffer stocks of cash.

normally thought to be willing to ease any change in the standard of living forced upon them by changes in income in a period of unemployment or enforced part-time work by spending out of reserves (accumulated net worth). The ability to finance consumption expenditures out of net worth is, inevitably, determined by the volume of cash and encashable assets available.¹⁸ The longer a family has been drawing down its net worth, the less is the amount of stabilizing-consumption expenditures which can be relied upon from that family. The greater the number and the importance of sectors which are already and have been depressed, the lower will the lefthand ridge of stability efficiency be: depression cannot be attributed to a single cause since the state of any number of sectors is important in determining the overall economy's stability efficiency or resilience to shock. Further, the larger the number of sectors (regions) which are in recession and the longer the duration of those recessions, the less likely are people in those sectors and/or regions either to have interest-elastic investment functions or a willingness or capacity to draw down reserves. This latter point will be reinforced to the extent that net worth will be substantially reduced if bad regional conditions have had an adverse effect on local property values.

The height of the lefthand ridge is determined in part by wealth distribution. What matters is the amount of wealth owned by those economic units which are *willing to dissave*: families with low levels of wealth will not be able to provide much in the way of stability efficiency. It is possible then for an economy to become vulnerable to depression as more and more sectors operate at very low levels of production.¹⁹ If unemployment insurance and welfare payments lapse

¹⁸ The capacity for stabilizing consumption depends upon the price of financial assets so that a collapse of the stock market will diminish the national capacity for stabilizing consumption (KEYNES, 1936, p. 319). One might argue that the decline in interest rates will increase the net worths of bond holders: while this is true for holders of risk-free bonds, there will be an increase in the risk premium charged to debtors and "risky" bonds may lose market value (see MAYER, 1968, p. 219).

¹⁹ The existence of sectors with low levels of output and profits can be a byproduct of inadequate adjustment to external shock (MICHALSKI, 1983) and also to temporizing protection of the threatened industry. This aspect of stability inefficiency is not developed in this paper but problems of rapid and inadequately-accomplished adjustment clearly can contribute to vulnerability.

It is not possible unequivocally to attribute a given direction of change to the amount of stability efficiency in the economy with the length of time that the economy spends in the normal domain with GDP of less than PCT, but there must be a presumption that the deeper the recession and the longer its duration, the more is stability efficiency eroded.

after a period of time, then each period sees a diminution of the stock of stability efficiency as more people come nearer to exhausting their entitlements.²⁰

Following Kindleberger (1973), the model confronts the role of the international economy in contributing to depression. Foreign dissaving (a current account deficit) offers a third source of stability efficiency for a nation – the ability to increase net exports of goods and services in the event of a sharp fall off in domestic aggregate demand.²¹ This is available only if there exist countries willing to accept and able to finance [additional] net imports (Gray and Gray, 1988/89). In the event of a global recession or depression, this possibility is negligible: global recession or depression will reduce the level of net imports perceived as tolerable and there could be severe problems of financing such imports. The world economy traditionally relies upon some countries to serve as net sources of effective aggregate demand by running deficits on current account. These deficits have to be financed and national balance sheets and bankers' recent experience set limits to the ability of countries to finance deficits (Cf. Keynes, 1936, p. 158). If some traditional suppliers of effective demand are unable to finance their existing debts and must therefore reduce their target deficit on goods and non-factor services in order to be able to service existing debt, the world loses a source of effective aggregate demand.

Given the established belief that the 1929 Wall Street Crash and the rash of bank failures in the United States in 1932/3 were major contributing factors to the depression of the 1930s, it is necessary that the role of financial crisis be an explicit component of any theory of depression. A financial crash or crisis has a double-edged effect: it will simultaneously provide the necessary adverse shock *and* it is capable of destroying stability efficiency. A financial crash destroys asset values and sharply reduces the possibility of large-scale stability-efficiency consumption expenditures, is likely sharply to reduce the willingness of corporations to undertake stabilizing investment, and

²⁰ This suggests that the lefthand ridge may move inward during the process of sinking into a depression.

²¹ International linkages also open up a national economy to an adverse shock having its origin in a foreign country. The more effective these linkages as a transmitting mechanism, the greater is the proportion of the foreign shock that will be transmitted to the individual nation. Thus, the international sector becomes more important as the global economy becomes more integrated (Cf. EICHENGREEN and PORTES, 1987, p. 11).

will increase the innate caution of lenders either by raising what are seen as acceptable credit standards or by raising the risk premium charged for a loan.²²

The phenomenon of financial crisis has some regularity in pattern: drawing on the work of Minsky (1972) (1977)²³ and Kindleberger (1978, Ch. 2), its general sequence can be identified even though individual crises will necessarily have many idiosyncratic features. Financial crisis involves four stages:

1) "Displacement" which is an exogenous shock increasing demand for an important sector of goods and aggregate demand in general;

2) "Euphoria" when the burst of prosperity that follows displacement leads to speculation in commodities (and financial assets) driving up their prices, and to over-leveraging (excessive gearing) by individuals and corporations;

3) "Financial distress" involves the reintroduction of realism and doubt and an awareness on the part of a growing number of entities that they are overextended. This leads to a reversal out of assets and debt and towards liquidity with adverse effects on effective aggregate demand and on the prices of speculative assets;

4) "Collapse" begins with the failure of a bank or a large firm and possibly with an announcement of a swindle. Panic sets in and the rush for liquidity becomes pell-mell and cannot be satisfied. How deep the convulsion grows depends on the degree of overextension during the euphoria, on the degree to which it was eased during the period of "financial distress", and the volume of lending by the central bank.

Financial crisis will provide the trigger which can precipitate a depression as well as sharply reducing the stability efficiency of the economy. The ability of a financial crisis or crash to thrust the economy into depression does depend upon the pre-crisis level of stability efficiency and on the size of the crash (White, 1984). It also depends upon the fragility of the financial system in the face of recession. High leverage by corporate enterprises (fashionable re-

²² A succinct description of the linkage is: the height of the lefthand ridge is a function of net wealth which is a function of liability prices: these, in turn, are linked to asset prices which are a function of long-run expectations.

²³ These references are only two of many publications of Minsky on the subject of financial fragility.

cently in the United States and elsewhere in terms of leveraged buy-outs) is likely to make the financial system vulnerable to recession in that a deep recession may force certain bonds into default and could generate bankruptcies of firms that would have survived the recession in the absence of such heavy interest costs.

Only if there is some deliberate and enduring policy to suppress an economy – such as was experienced in the 1920s when Britain tried to re-establish sterling at \$ 4.86 or is presently applied in Mexico – will depression be invoked by a gradual weakening of the economy followed by some minor adverse shock (although such a scenario is the essence of Leijonhufvud's model). However gradual erosion of stability efficiency will reduce the required size and increase the probability of a financial collapse. This is the "whimper" process. It is also possible that an economy can be taken directly from a state of euphoria into depression by a financial collapse of sufficient magnitude. Political events aside, the most important measures to promote stability efficiency will be financial – preventing the financial system from becoming fragile and susceptible to crisis by insisting on the capital adequacy of financial institutions and on the avoidance of high leverage of non-financial corporations (unless a lender of last resort process has been instituted). Consideration of the fragility of national financial systems in an interdependent global or supranational market must allow for the possibility that it is the international financial system which is fragile and for the ability of an integrated financial system to transfer shocks more effectively among the network of institutions and markets and, in this way, to seek out the weakest link (*Cf.* Eichengreen and Portes, 1987, p. 11).

The essence of the problem is the self-reinforcing character of the process. Low stability efficiency weakens resistance to and enhances the probability of an adverse financial shock. This, in turn, makes stabilizing expenditures much more difficult to achieve because lenders become severely risk-averse which, in turn, further erodes stability efficiency. The "bang" explanation of depression is triggered by a large financial shock in what would seem otherwise to be an economy with some buoyant and some depressed sectors. The "whimper" explanation has the source of the financial shock in the low stability efficiency of the economy and the likelihood that this will generate a financial crisis.²⁴

²⁴ A political event can trigger either explanation of depression but the political event can be "smaller" the more fragile is the financial system whether the fragility be due to euphoria or to the existence of low stability efficiency.

IV. The failure of equilibrating forces

The crucial question in any analysis of *depression* is why the economy does not spontaneously revert back to a satisfactory rate of economic activity within the normal domain (Kindleberger, 1973, p. 23). In other words, a theory of depression must countenance a lasting condition without effective servomechanisms – otherwise it is merely a deep recession. Three forces impede the return to the normal domain: 1) a shift in the long-run expectations function; 2) "scar tissue"; and 3) the need for households and corporations to restore liquid asset positions. All three impediments become larger as the depth and duration of the depression increase.

An explanation of the loss of the stabilizing economic servomechanisms requires the concept of a long-run expectations function (E) to be explicitly introduced. This expectations function is capable of shifting in response to a change in the experience of economic units: It (E) dominates the short-run expectations function, E^* , so that short-run expectations are limited to a range predetermined by the position of E . It is possible for economic units to have optimistic short-run expectations but still to be tied to the depression domain of the economy.²⁵ A shift in the position of E can be quite sharp as the economy moves out of the normal domain but it will move back towards the usual "normal-domain" position of E only slowly as recent experience begins to restore some sense of the possibility of normal conditions. It is possible for E to move by small amounts within the normal domain but this merely affects the position of the point of central tendency within that domain. As long as any such movement is matched by a similar movement of the corridor of tolerance, no policy problem will be seen to exist.

Kregel (1976, pp. 210-11) points out that Keynes did conceive of a variable E (long-run expectations) that would shift independently of the system and would, in this way, affect the functional relationships of investment and consumption. In distinction from Keynes who assumed the possibility of stochastic shifts in E , this model posits

²⁵ The value of E^* could be much more sensitive to bad news in the depression domain and this could account for the extreme sensitivity of the U.S. economy in 1937 to the actions of the U.S. Federal Reserve Board. See FRIEDMAN and SCHWARTZ (1963, pp. 543-46) for a description of the 1937 collapse.

that E is determined by the lifetime experience of economic units (with recent experience counting more heavily but with no experience falling to a zero probability).²⁶ Thus a "leftward" shift in E will follow from a collapse of aggregate demand or from a gradual erosion of aggregate demand as stabilizing expenditures wane in the face of an ever-weakening economy: such a shift cements the economy into the depression domain. Once E has shifted and has confirmed the existence of depression, short-run expectations will vary around E 's position and can be optimistic or pessimistic only with reference to the position of their sheet-anchor (E). Pessimistic long-run expectations shift the investment schedule to the left by weakening the confidence of corporate executives to form subjective assessments of risk and, in this way, exaggerate inevitable Keynes-Knight uncertainty.

The experience of the "failure" of a capitalist economy to perform adequately (*i.e.* within the normal domain) and in accordance with previously-held ideas, saps the confidence of both entrepreneurs and households. Their confidence in the system is severely damaged and they therefore become much more tentative in making economic decisions involving exposure to risk. Kregel (1987, pp. 525-7) notes that a change in the [general] state of confidence will affect the "weight of the argument" with which entrepreneurs assess new evidence affecting investment decisions (see also Carabelli, 1985). A deep and long-lasting depression will affect the state of confidence for years to come to the point that in the late 1930s one could think of "animal spirits" as being negative: there is a natural urge to avoid action (Keynes, 1936, p. 161). This is the "scar-tissue" effect of depression which makes re-entry into the normal domain so much more difficult.

The third cause of the built-in resistance to re-entry into the normal domain is the fact that, as people become re-employed and firms make meagre profits, their first priority is to rebuild their stocks of liquid assets.²⁷ In the absence of aggressive lending by commercial banks, household saving becomes national hoarding. Here the "state of confidence" of bankers is of major importance and the role of financial crisis becomes paramount: experience of financial/banking crisis is likely to make bank lending much more conservative because of the scar-tissue effect and a lack of general confidence.

²⁶ This formulation differs from the so-called "availability and threshold hypotheses" of cognitive psychology.

²⁷ This hypothesis may be subject to empirical confirmation or refutation with regional data.

Depression is confirmed, if it is not caused, by the dramatic leftward shift in E which follows from a severe shock and the inability of the economy to generate the needed stabilizing expenditures. To escape from depression requires either a major and spontaneous expansionary disturbance (such as a major war which forces households and corporations to build up savings and private net worth) or overt, substantial and enduring expansionary policies by government.²⁸

V. Current relevance²⁹

A model of depression has value if it contributes to a better understanding of macroeconomic behavior under extreme conditions. The model has *relevance for policy* when stability-efficiency has been steadily eroded to the point that a political or economic shock could cause a crisis in foreign exchange markets of a severity sufficient to precipitate a depression.

The current danger is that some event will precipitate a flight from the US dollar, causing wild movements in exchange rates and sending financial and non-financial firms into insolvency and bankruptcy. The possibility of such a disruption in foreign exchange markets can be attributed to the large volume of easily-encashable (marketable) dollar-denominated assets owned by non-Americans and the possibility that a lack of confidence will trigger a pell-mell rush for a stronger currency. At the end of 1988, the value of dollar-denominated easily-encashable assets owned by private non-Americans was \$ 1.135 trillion (Table 1). Forecasts of the U.S. current deficit show the U.S. current deficit remaining in excess of \$ 100

²⁸ The concept of a dramatic shift in the value of E is fundamentally incompatible with the tight prior assumptions on which the analyses of the Second Chicago School are based (REDER, 1982, pp. 11-21). Tight prior assumptions presuppose the ability of spenders to determine what their own best interests require and that these actions lead directly to the new full equilibrium position (in the normal domain): these two forces interact and equilibrium is attained through independent self-seeking decentralized action. A shifting E is the essence of turbulence and the tight prior assumptions require tranquillity – they are compatible only with an economy in the domain of normalcy.

This example shows how macroeconomic entropy can be reversed – see fn. 7 above.

²⁹ The material in this section is developed more fully in GRAY (1990).

TABLE 1

OUTSTANDING FINANCIAL ASSETS OF NON-AMERICANS
IN U.S. FINANCIAL MARKETS
(End of year data in billions of U.S. dollars)

	1982	1983	1984	1985	1986	1987	1988	1989 ^a
Official Assets	189.2	194.5	199.0	202.5	241.7	283.5	322.1	335.6
Private Assets	378.1	456.0	527.8	674.1	878.5	992.6	1135.3	1208.6
U.S. Treasury Securities	25.8	33.9	56.9	83.6	91.5	78.5	96.6	120.5
Corporate and other bonds	16.8	17.5	32.3	82.5	142.1	171.1	195.2	} 423.0
Corporate stocks	76.8	97.3	95.9	124.1	167.4	173.4	198.4	
Liabilities of non-bank concerns	27.5	26.8	30.5	29.4	26.7	29.4	35.5	38.0
Liabilities of banks	231.3	280.6	312.3	354.5	449.2	540.6	609.5	627.0

^a = September 30th data.

Source: *Survey of Current Business* (various issues).

billion per annum in the absence of severe increases in taxation and a concomitant lowering of interest rates.³⁰ If there is a suspicion that the total rate of return on dollar assets measured, say, in Deutsche Mark or yen will be unsatisfactorily low or even negative, people of all nationalities will shift out of dollar-denominated assets. There exist many possible economic triggers of such a decision: the fragility of the domestic U.S. financial system, the existence of trade-related political-economic strains between Japan and the United States; the perception of the possibility of non-resident non-convertibility of the dollar, and the possibility that deficit-reducing measures in the United States will generate negative total rates of return on dollar-denominated assets for non-Americans. In addition, there is the possibility of some political trauma which will precipitate a flight from the dollar towards the home currencies in line with the principle that, in crisis, "home is best".

While a steadily declining current deficit on the part of the United States would reduce the likelihood of a pell-mell withdrawal, such an event might trigger a recession unless some other country (or countries) could be found to play the role of global locomotive although recent events in eastern Europe may have provided the world with a new source of aggregate demand if financing can be arranged.

None of this suggests that a panic withdrawal from the dollar is imminent or inevitable but there are obvious dangers of such a possibility and there is no mechanism in place to counter very substantial withdrawals.

VI. Conclusion³¹

The social cost or loss of economic efficiency of a collapse of a macroeconomy (global or national) into depression is, with the

³⁰ Subject to the requirement that the expected total return on dollar-denominated assets must exceed that expected to be available on assets denominated in other convertible currencies if the stock of indebtedness is to be maintained.

³¹ The model developed in this paper has intriguing doctrinal insights. It may be hypothesized that Keynes wrote his *General Theory* from the standpoint of an economy in the depression domain and that the apparatus was unwittingly pushed over the threshold of structural change into normalcy by Hicks in his famous IS-LM construct. It is not clear that either economist understood the significance of the threshold

possible exception of hyperinflation, the single most serious economic event that can occur. In addition to the human misery arising from the actual waste of unemployed resources (with all of its potential for political harm), there is a loss of capital, the establishment of jurisdictional rules which impede efficiency when the system ultimately returns to the domain of normalcy, and the scar tissue left on the minds of corporate executives and bankers that affects investment behavior for many years. This paper has provided a model in which an economy can cross the structural threshold into depression by virtue of a protracted recession or as a result of an adverse economic shock (including a financial crisis). It is quite possible that the less the stability efficiency of an economy, the greater is the probability that some financial crisis will be triggered. The expected value of the costs can be sufficiently great that good macroeconomic policy requires that policymakers maintain an awareness of the level of stability efficiency in the system. At times concern over stability efficiency may need to dominate more standard, short-run macroeconomic policies concerned with rates of capacity utilization.

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and Keynes has spoken approvingly of Hicks' construct. Extreme or naive Keynesianism retained two features of the depression model in its treatment of normalcy – the extreme inelasticity of the investment schedule to the rate of interest and the ineffectiveness of changes in monetary conditions. Monetarism, tied into its tight prior assumptions (GRAY, 1989), blandly assumed a tranquil system with adequate stability-efficiency in which economic units were capable of integrating risk into spending decisions and were, therefore, not subject to severe turbulence and accompanying Keynes-Knight uncertainty. Similarly Pigou in his effort to contribute to macroeconomic problems viewed the economy as a unitary-domain, well-behaved entity (SOLOW, 1986).

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