Part IV *Consensual Acts*

It used to be said in Cairo that if ones watch or other valuables were stolen they could be found in the bazaar the next morning and bought back. Such conventions or customs provide for a modicum of social order. When laws must be created we refer to custom; when laws fail we rely on convention to maintain public behavior. What lies at the core of the never-ending struggles over laws and customs within and between societies is the matter of consent. A law consented to must at some level conform to unwritten notions of acceptable acts; a law imposed on individuals without their consent must at some level violate their sense of public accommodation. These are relations which undergo constant change. We press for stability of the whole, but chafe at limits to our individual actions.

So it is with money. Cantillon, one of the first to pay close attention, wrote "Mr. [John] Locke says that the consent of mankind has given its value to gold and silver. This cannot be doubted since absolute Necessity had no share in it. It is the same consent which has given and does give every day a value to Lace, Linen, fine Cloths, Copper and other Metals." As we have seen, the matter is not quite so simply understood. Lace and linen have personal uses, uses which may not be the same from one individual to the next; certainly not from one year to the next. Money has no personal use. Nonsense, some will immediately object. My money is my money and I will do with it whatever I want.

What will you do with it? If you wish to do something with those bits of metal and pieces of paper, feel free. But used as bits of metal (we were warned never to stick pennies in fuse boxes) or pieces of paper, they shed their function as money. Money can only be used in exchange. We exchange our money for something else, something we do not yet have. To obtain that something, someone else must be willing to accept our money. Money is a social phenomenon. In order to grasp just how peculiar this is - and it is almost as peculiar as language, with which money has much in common - we must understand that the value of each bit of money depends on the value of all other bits. But the value of money emerges from its use in individual transactions. What you do with your money affects the value of my money and neither of us can predict what that will be until it happens.

To help us understand what we are doing with the use of money I must use that slippery term 'system'. We began this investigation by noting that banks together constitute a banking system. We did not look closely at that system. Our present financial and economic crisis is centered on the banking system; governments are frantically trying to shore it up. The use of money is also a system, one that has such similarities with the circulatory system of the body that it lends itself to that metaphor: money, it is often said, is the life-blood of the economy.

It isn't. Nor is the banking system co-extensive with money. Money has its own character and its own life and, however much it has been despised by those whose interests lie in the elevation of the spirit, money is remarkable. Money does what the alchemists dreamt of: it converts dross metals into gold. Unfortunately, it also converts gold into dross. It is the universal transformer and also the universal solvent.

Every exchange of money for something - shall we say linen - measures the value of linen and conversely measures the value of money. This is an inescapable consequence of *exchange*. It leads to a teeter-totter kind of effect in an economy, where a change in supply of linen seems to make money more or less valuable, and any change in supply of money seems to make linen more or less valuable. These changes in turn affect subsequent exchanges in that we question other

opportunities: should we substitute silk for linen? Every right-thinking economist is made queasy by this see-saw effect. They insist that the value of money ought to be held constant.

Using waffle-making as a metaphor we discovered that value is the product of (at least) two variables, the point at which a particular combination (heat and time) produces a superior outcome. The notion that the value of any one variable can ever be constant is a confusion (a constant cannot be a variable) which stems from a belief that something, like gold or waffles, has *intrinsic* value. That notion was dismissed *c.*1870 by economists who brought to economics the concept of the margin, which demonstrated that in many cases value diminishes with an increase in the quantity obtained. (The more waffles one eats, the less hungry for waffles one will be.) Supposing this to be true of money, it would be the case that for each individual the more money one obtains the less valuable each additional increment of money would be. Yet money is a purely social phenomenon so how could it be possible for money to retain a constant value, yet have a variable value for each individual recipient of money? This is part of the puzzle we must solve to understand how a monetary system works; indeed to understand how any system which involves living organisms functions.

We need to distinguish two types of systems. One is a simple mechanical system where all the parts are connected and which operates through feedback devices, like thermostats on heating systems. The other is a system where the components may behave independently, like the cells in a living body, or a swarm of insects, which does not rely on direct feedback to coordinate the parts with the whole, but on the effect that the activity of the individual cell or insect has on other cells relative to the conditions that affect both or all. This is a point to which we will return, since I will contend that the behavior of financial markets resembles nothing so much as a swarm of gnats.

As for the monetary system, one part of the puzzle is the requirement that the separate bits of money be identical. A currency must be uniform: every dollar must be identical to every other dollar. If not, then, as was the case with metallic coins, the inferior money would be circulated and the better money would be withdrawn and put to other uses. The failure to maintain a uniform currency leads to Gresham's law: bad money drives out good money. The great lesson in maintaining a monetary system came in England in 1692 when John Locke successfully persuaded the government that there should be a complete recoinage of the currency. Locke argued that the value of the shilling then in use derived from its silver content and since the shillings then circulating were debased - that is, they contained less silver than their nominal value demanded - the fairness of payments could not be assured unless a new full-weight currency was minted. He was supported in this position by no less than Sir Isaac Newton. The government did as they were told and at considerable expense minted new shillings. The result was that shillings were promptly exported where the silver could be more profitably traded. It was but a few years until England was forced to abandon the silver standard in favor of gold. (There is a splendid account of all this in F.A. Hayek's *The Trend of Economic Thinking.)*

The gold standard had a good run until war and depression forced its abandonment. Since then we have had no standard, yet engraved pieces of paper with pictures and symbols and signatures continue to circulate as money. Do we not need a standard? Is money a kind of nothing out of which something emerges? (Alert the physicists.) It is not exactly nothing. It is the kind of nothing that zero is: a placeholder. We accept these bits of paper in exchange for the products of real effort because we assume that we can exchange them for equal products. That assumption relies on what was referred to above as consent. We may consent to the process; we could not consent in advance to the result of any particular exchange. The best we can demand is accurate measurement. Thus the one clear requirement: a currency must maintain the uniformity of the nominal bits. One dollar must be identical with any other dollar. However, the value of the currency, of the individual

bits, can only be determined in exchange. Much as most economists would like to dismount, there is no getting off the teeter-totter.

Uniformity of the bits does not mean uniformity of the value of each bit. For example, how do we discover the relative value of bits of two different currencies, say dollars and pounds? If money is a specific quantity of something, say gold, then we may turn the teeter-totter into a balance and weigh a dollar against an ounce of gold and weigh a pound against an ounce of gold (pounds? There was a big clue, yes?) and any difference will tell us the difference in the value of the currency relative to the value of gold.

If money is not a specific quantity of something how are we to compare the values of different currencies? *The Economist* uses a device of their own making called a 'Big Mac' index. It seems that McDonald's is now virtually ubiquitous, selling an almost uniform product the price of which may be used to measure any variation of the relative values of currencies in the money market. This does grasp the need for uniformity in the use of currency but neglects the perturbations that occur when one market is imperfectly linked to another. If a 'Big Mac' costs 3.50 in the U.S. but 1.80 in China (in dollars converted to yuan) we may conclude that the yuan is undervalued relative to the dollar. But 'Big Mac's' are not exportable, so whatever would bring purchasing power to parity in the two currencies would have to happen in some other way. We would need to find something that is both uniform and transportable and for which per capita demand is roughly equivalent in the several markets which use different currencies.

A monetary system is most reliable as a measure of value when it furthers the exchange of a uniform set of relations. When a uniform currency is exchanged for a uniform product (say 'Big Mac's' or wheat or oil) and where the use or benefit of that product is roughly equivalent for all users, the price of the product in each exchange, although determined at the margin - that is, the price of the last exchange in any limited set of exchanges - constitutes fair value for all participants. The further we move away from uniformity the less reliable will be the use of money as a measure of value.

What is the value of money when it is not being spent? When money is between engagements, so to speak, it dwells in uncertainty. It is the uncertainty that surrounds all savings, as we have considered in the preceding parts of this essay. In a recent survey of the state of Russia in *The Economist* the writer remarked, ". . .there is so much uncertainty around that most people would rather spend than save." This struck me as wildly counter-intuitive but Russians must find it otherwise. I would think that saving would be a rational response in the face of uncertain contingencies. But if the value of saving is itself uncertain then why not just eat, drink and be merry.

What is the value of money when it is not being spent? The question has something of the same form as the familiar Zen koan, what is the sound of one hand clapping. The sound of one hand clapping is not, as mathematics might have it, one-half the sound of two hands clapping. The sound of one hand clapping is a *potential* sound, which, were it to meet another hand which was not otherwise engaged, would produce the sound of a clap. The concept of 'potential' has been in persistent use at least since Aristotle. It is useful as a way of accounting for the coming-into-being of events that the flow of time insists we must allow for. I think of it whenever I drive past steep cliffs on my way to town, where large boulders can be seen above, waiting for the opportunity to convert their potential energy into the destruction of my car and me. It is a useful concept, potential, but our use of it is really not quite right. Until something actually happens, until the boulder actually falls, we cannot assert that it will happen. Absent events, all is potential. Or nothing is potential. You pays your money and you takes your choice. But what is the value of the money before you pay it and take your choice?

Holding money, not spending it, is an act of saving. Saving is a private act. (In this discussion, 'private' is used in the sense of privacy, a personal matter, as opposed to public, acts which involve other persons.) Investing is a public act. We save from present effort in order to enjoy something in the future. The moment of saving and the moment of enjoyment exist as personal experiences connected by personal expectations. If our saving takes the form of holding money, then we have a question of value for which there is no resolution unless and until the money is spent or invested; that is, until the money resumes its public circulation. Yet the circulation of money will be affected by a private choice to save. We might choose to save Big Mac's or gold which have personal uses and require no public stamp of approval. Holding money is a private act which has social consequences.

Here we would be wise to consult Kenneth Arrow, an essay entitled "Rationality of Self and Others in an Economic System". (Arrow, along with Debreu, produced a defensible model of the determination of prices which leads to a general equilibrium of supply and demand. In "Rationality. . ." he questions some of the assumptions that are required to make general equilibrium models defensible.) Arrow writes, "A complete general equilibrium system, as in Debreu [1959] requires markets for all contingencies in all future periods. Such a system could not exist. . . Second, markets conditional on privately observed events cannot exist by definition. In any case, we certainly know that many - in fact, most - markets do not exist. When a market does not exist, there is a gap in the information relevant to an individual's decision, and it must be filled by some kind of conjecture. . ."

As we observed above in the discussion of opportunity, when it comes to the transition from here to there and from now to then, there are no certainties. We must make guesses, conjectures to fill the gaps in our information. So it is also with the transition from private to public, the transition from a personal choice to save and a choice to invest or spend which is necessarily public since it involves others. We form our personal expectations and seek some way to fulfill them. The counterparty who approaches an exchange or investment brings to the transaction other expectations of private experience. These must necessarily differ, otherwise there would be no exchange. As Arrow notes, identical individuals do not trade. But private expectations do not a market make. Is one or the other private experience to prevail in the exchange; are we always to be confronted with an offer we can't refuse or a disappointment we can't protest? If we wish to resolve our differences to mutual benefit, we must have a neutral space.

In equilibrium models the neutrality requirement is addressed by assuming both perfect competition (no one participant can influence prices) and perfect knowledge (prices are known to all participants). Everyone concedes that these conditions are unrealistic. General equilibrium models do not include saving and investing apart from specifying exchanges to be made at future dates. Yet the value of any future exchange will be contingent on what happens in the present as well as on what happens in every moment between now and then. As Arrow observed, such a market could not exist. It appears that one person's uncertainty will be another's opportunity and in the end the claim of one upon the other may or may not be fulfilled. When we speak of financial risks, it is this relation of which we speak.

Still, the problem of the transition from private to public remains. It remains at the core of at least two economic relations that have embroiled society from the beginning: landlord-tenant and creditor-debtor. How do we find the value for the *use* of something, where both parties continue to hold a claim on what is being used? Something here is being exchanged, but not in its entirety. Neither party can be certain of the value of the contract until the conclusion of the contract. The

value which obtains at the conclusion of the contract is the product of every instance that comprises the life of the contract. At any given instance conditions may change that render the contract either more or less valuable to one or the other party. Even if periodic renegotiation of the terms of the contract were agreed to, the residual and potentially conflicting claims to what is being used remain in place. The value of the agreement will only be known at the conclusion. Until then, the parties must rely on their private conjectures for which there is no market.

I sense some frantic hand-waving at the back of the audience. Someone wishes to point out that there are markets for stocks and bonds and mortgages and commodity futures and even more arcane financial instruments which, as Gibbon once said of conditions in Ireland, are easier to deplore than to describe. Indeed there is trading in such instruments or contracts. My goal, such as it is, is to bring some clarity to these markets, such as they are.

Let us note that there are many, possibly even most, economic transactions which involve some sort of delay between agreement and fulfillment. Most of us must work before we are paid. We order goods before we pay for them; or we pay for goods before they are delivered. Arrangements of this kind will only endure if there is trust. (Fool me once, etc.) Unfortunately if there is something to be gained by trusting others, there may be something to be gained, perhaps even more, by betraying that trust. If we place a value on truth, then there is value to be appropriated by simulating truth. Lying and cheating are more refined forms of snatching and grabbing, harder to observe since they flourish in the period of delay before fulfillment or before revelation.

Saving is a choice to defer use or consumption to a later time; borrowing is an opportunity to have something now we have not yet earned. If we lend our saving, we surrender any opportunity of use unless and until the saving is returned. We may well ask to be compensated for this loss of opportunity, a payment of what we call interest. The borrower is willing to pay this interest for the chance to seize the moment. Why does the saver not want to seize the moment? Does the borrower know something the saver doesn't?

The borrower and the saver may differ not only in their expectations about the future but in their perception of the present. The view from 'here' is not the same as the view from 'there'; the view from above the boulder sitting on its cliff is not the same as the view of the boulder from below. 'Potential' may not be equal in all directions. This experience may lead to the discovery that a balance scale may be turned into a lever by simple rearrangements. What a saver lends and what a borrower receives may turn out to be of unequal value. There may be no way to find a neutral space, a market for exchanges that are based entirely on expectations which cannot be weighed in a balance scale. The saver always has more to lose than the borrower. Enter the intermediary, the go-between, the broker, the bank.

A mention was made of cocoa futures in an earlier part of this essay. Let us imagine a small community of cocoa (or other agricultural product) growers. Some of the growers have been diligent and frugal and have saved money which they have deposited in a bank. One of the growers has been a little less diligent and not at all frugal. To get through the next season he finds he will have to have a loan. He applies at the bank and is given a loan against the value of his land. If it proves to be a poor season he could actually lose his land. He hatches another scheme. Through an agent he buys futures contracts on his neighbors' crops. He plants no crop of his own. When the harvest comes in it proves to be a poor season; his missing crop raises the price of cocoa. He makes a good profit on the futures contracts.

This sort of maneuver is excluded from the standard model of general equilibrium where no

one producer is permitted (the requirement of perfect competition) to have an effect on prices. But there is always a difference in the conditions of production which leverage will increase. The notion of perfect competition is a fallacy which Ricardo and Malthus, to say nothing of Darwin, would have spotted. It is an example of the fallacy of uniformity.

Would the growers have lent their savings to their neighbor had they known in advance of his scheme? Would they have created this opportunity, as it were, had they suspected it would not be to their advantage? The bank, as intermediary, had no compunctions. The bank cares only about the difference in what it must pay the growers for their deposits and what it can earn from the loan to the speculator. The bank's interest lies entirely in interest: minimizing the interest paid and maximizing the other. To do this the bank must assure the depositors they will get their savings back and on the other side to reduce the risk that the speculator will fail to pay back the loan. The bank retains a lien on the land against default on the loan. But, perish forbid, if the bank has to foreclose on the land, the price of the land will turn out to be dependent on whether a buyer can obtain financing. Does the bank offer the buyer a loan? Does it have a choice? The land is sold, the speculator's loan is repaid, and the depositor's money has now been loaned to the buyer of the land.

What if the following year turns out to be a poor year for cocoa and the growers lose money on their futures sales. The new grower, who had bought the least productive land, will lose even more. He will not make his mortgage payments. Once again, the bank will have to foreclose on the land. At the same time some of the older neighbors may decide to sell their land and retire before another poor year wipes them out. The price of land begins to fall. The bank would not make enough on a land sale, even if it provided financing, to repay the loan. Since it has been a poor year, savings fall and growers withdraw their deposits. The leverage which the bank had provided to the speculator has vanished from the bank's balance sheet. What is the opposite of leverage? We have no term for the collapse of balance sheets. We have two terms which may apply to the condition the bank now finds itself in. One is illiquid and one is insolvent. Both point to the perpetual hazard of relying on an intermediary when it comes to saving and investing.

Banks have their origin in two functions: a vault for security of deposits and letters of credit (bills of exchange) for payments. In both these functions banks act as intermediaries and the accounts banks must keep show the deposits that have been made in the bank (which are liabilities of the bank) and the loans or other forms of credit which the bank has made (which are regarded as assets by the banks). Assets and liabilities must balance. We think of banks as physical places where cash is kept (the vault) and checks are cashed and loans are made; these are the banks' functions as intermediary between payers and recipients, savers and borrowers. At bottom a bank is its balance sheet. Here is where the questions of trust and consent must find some resolution since the "balance" of the values counted as assets and liabilities is a matter of conjecture, of assumptions about present and future behavior which is both private and uncertain.

The "balance" of a bank's balance sheet is a matter of timing. Every day is a day of reckoning: money in, money out. A good day for the bank is a day when more money comes in than goes out. Depositors are reassured that a bank is 'sound' if they are given their money whenever they ask for it. Maintaining this facility requires a reserve for the days when more money goes out than comes in. The initial reserve of a bank is its capital, a banker's own money which he uses to establish the trustworthiness of his facility. Any money leftover from what a bank earns on its assets that is not paid in interest to depositors is credited to the bank's capital. The wider the 'spread' between interest rates the more money the banker will earn on his capital. The more loans a banker

can make for a given base of deposits, the higher will be the return on his capital. As Bagehot pointed out, bankers get rich using other people's money.

It does not pay to hold a large reserve against the day of unexpected withdrawals. Bankers plot the ebb and flow of money through the depositors' accounts, producing rough statistical models that reveal the times of the year when more cash is needed. But there are always the unforeseen contingencies. If banks hold sufficient reserves to provide for all contingencies they will not make much money. Each bank would prefer to rely on another bank to provide it with cash in the event of an unusual contingency. Who gets to be 'it'? There were times in the past when some rich bankers thought they could better manage the risks of their profession by bringing their competitors to heel in times of stress. When that task proved to be more than even the richest banks were willing to undertake, governments were brought in as partners and guarantors of a lender of last resort.

The story of central banking is fascinating in the way that a slow-motion film of any disaster is fascinating, but that shameful entertainment must be postponed for another day. We need to continue our examination of what really constitutes a bank, that is, its balance sheet.

When a bank makes a loan it creates a deposit. This is the wonder of banking. It is the opposite of saving. The amount of the loan is placed on the asset side of the balance sheet and the money now available to the borrower is placed in a deposit account on the liability side of the balance sheet. The bank does not need new deposits in order to make loans. The bank needs deposit accounts to keep the money it is creating through lending within the bank. Let us say the bank makes a loan to one of the growers. The grower spends the money for fertilizer, equipment, etc. The sellers of fertilizer deposit the money in their accounts at the bank. The money moves from one account to another within the bank. If there are other banks in the community some of the money may move to accounts in other banks. Money flows among banks. No one bank can create deposits (and assets) beyond its ability to pay out money on demand; the more money that stays within the bank, the higher the limit on asset creation.

All the banks together can create deposits and assets without limit; the banking system functions as though it were a single very very large bank. All that matters is the balance between assets and liabilities. If some of the assets prove to be worthless (some land just won't grow cocoa) the bank would not be able to meet all its liabilities. The bank will have to draw on its reserves and hope that all the depositors will not ask for their money at the same time. But banks do not make money holding money in reserve; they prefer to rely on other banks to lend them money in time of need. All the banks together rely on central banks. Knowing that all the banks together can create deposits without limit, governments and central banks impose limits by requiring banks to hold a minimum amount of capital in proportion to their assets. It is always too little and when called upon, too late.

As I said, none of this is a secret. The banking system as a whole can create assets almost without limit. Borrowers, however, are not in unlimited supply. The value of a loan depends on the interest it will earn and on the probability it will be repaid. To expand its assets a bank increases its risks since it will have to lend to those whose land (or other productive effort) earns less than the more productive; that is, the marginal borrower as described above in the cocoa growing business. As the bank assumes more risk, its role as intermediary between saver and borrower is compromised. If the bank charges interest high enough to compensate for probable defaults by marginal borrowers, it may lose more reliable borrowers who can find money at lower cost. If a bank does not pay its depositors enough, they too will go elsewhere. Since bankers know that their asset-creating success depends on all other bankers, they see to it that competition to attract savers or borrowers by raising or lowering interest rates is kept to a minimum.

How are interest rates to be determined? We have looked at the problem of finding a 'neutral' space for borrowing and lending since saving is a private act and there are no markets for private acts. For borrowers it is the problem of weighing perceived opportunity against possible risk; the more private the perceptions, the less likely they will be valued in a neutral market.

In the case of the cocoa growers and speculators, the difference between a 'spot' price of cocoa (the price which could be obtained 'now') and the 'forward' price (the price paid for delivery of the cocoa at a later date) can be understood as a rate of interest. Every transaction for which payment is made 'now' for delivery 'then' carries what we may call its 'own' rate of interest, a concept which emerged in a discussion between Hayek and Piero Sraffa, and was later adopted by John Maynard Keynes. How 'own' rates of interest are determined is a matter of the existence of markets, and as Arrow observed, most such [possible] markets do not exist.

If a market is neutral, which requires that no party be able to dictate the terms of exchange, all the terms of an exchange can be subject to a kind of negotiation. Parties to an exchange will accept the amount to be exchanged for a stated period of time (either spot or future) at an acceptable price. (We must keep in mind that a price is always a ratio. However, for any given ratio, the *amounts* that may be traded at any given time may vary.) Prices, amounts and time periods will be flexible, all subject to variations which suit the needs and expectations of all parties. If prices, amounts and times were not each able to vary to accommodate both parties the burden of adjustment would fall unequally. If the rate of interest were fixed, adjustment could only come by changing quantities or time periods.

How do banks determine interest rates? As was noted above, banks as a system can create assets without limit; the only check on this power is the risk of default and, on the liability side of the balance sheet, the threat of withdrawal of deposits. It is one of the perversities of banking that to compensate for the risk of default on loans, banks charge higher interest rates on riskier loans, thus ensuring that there will be more defaults. This makes the system more dependent on reserves which no one bank finds it profitable to maintain. So the interest rate for the banking system which determines other interest rates the bank will charge borrowers or pay depositors is the interest rate the bank must pay for reserves. This interest rate is set the by reserve banks. How central banks fix this interest rate is a critical part of the slow-motion disaster that is the saga of central banking. The importance - and this importance is entirely negative - for an economy is that the interest rate is thereby *fixed*. The neutrality of the money markets is sacrificed to the needs of intermediaries, the banks. For any given interest rate, the economy must adjust by changing the amounts saved or borrowed at that rate, or by changing the period of time for loans and deposits. This may lead to dislocation of effort within the economy, such as building too many houses relative to the growth of income.

Time seems to fly when one is losing money. Remember the 'goldmine' effect? Was it only last year, or maybe the year before, that people thought houses were goldmines. As was described earlier, the effect of prices rising without effort could be found in the largess of banks, expanding their balance sheets by creating assets the price of which was largely determined by banks' credit creation. Sellers of houses were so thrilled by their good fortune that they did not pause to consider that if houses cost more in terms of money, then money was worth less in terms of houses. The value of money was falling as rapidly as the price of houses was rising.

Why did we take no notice? Only those foolish enough to attempt to save enough money to buy a house would have noticed. No matter how they saved, the interest rate the bank would pay them on their saving would not be enough to keep up with the rising cost of houses. Banks do not

care about absolute levels of interest rates. Banks only care about differences of the rate they must pay and the rates they can charge. The spread may narrow for the banking system as a whole, but as long as the money stays within the system, the banks can make their profits by expanding their balance sheets.

In such a system, opportunity costs for savers loom large. What inflated the housing bubble was an interest rate on forward money that was too low, combined with lack of restraint owing to a missing market. There is no forward market for houses. Faced with rising house prices, which means falling value of money, those who wished to buy a house in the future should have been able to purchase housing futures. Those who expected to have to move from their houses in the future might want to sell housing futures. (Which would have affected the market for home equity loans and 'reverse' mortgages for the better.) Without a forward market for houses, there could be no way to determine the 'own' rate of interest for houses. I know this sounds peculiar. Let me quote Keynes: "The money-rate of interest - we may remind the reader - is nothing more than the percentage excess of a sum of money contracted for forward delivery, *e.g.* a year hence, over what we may call the 'spot' or cash price of the sum thus contracted for forward delivery. It would seem, therefore, that for every kind of capital asset there must be an analogue of the rate of interest on money. . . Thus for every durable commodity we have a rate of interest in terms of itself, - a wheat-rate of interest, a copper-rate of interest, a house-rate of interest, even a steel-plant-rate of interest."

Unfortunately, houses are not a uniform commodity like money or cocoa, so there is little possibility of a neutral market; certainly no futures market. But without such a market we have no way to determine the 'own' rate of house interest; which means we cannot weigh the money rate of interest against it to determine the opportunity cost of borrowing or saving. We are stuck with the interest rates set by the banking system, the intermediaries who use other people's money to profit from the risks that other people take in buying and selling houses, or wheat, or cocoa. As Arrow pointed out, for most contingencies there are no markets. We must fill the gap with our conjectures; the financial system lightly turns to thoughts of risk models.

Intermezzo

A few words need to be said about this problem of risk in the financial system. The movers of money do not care about absolute (real) risks, they care only about the difference in costs that risk entails. Consider our cocoa grower. A grower faces real risk in the vagaries of weather, plant diseases and so forth. She also faces financial risk when she brings her crop to market if the price for her beans turns out to be less than her costs. She can remove the financial risk by selling her crop forward at a price that will cover her expected costs. But now she is obliged to deliver a cocoa crop to this buyer at the appointed time. Her real risks, weather and disease, remain. Perhaps she could purchase some sort of insurance so that if her crop fails she could meet her obligation. She finds she can purchase an insurance policy from a mutual company that specializes in this sort of risk, United Growers Holdings or as they refer to it in the county, UGH. UGH accepts the risk of her crop loss by sharing it with other growers who purchase insurance who may or may not lose their crops. Insurance does not remove risk; it redistributes the cost of risk.

UGH deposits the premium in the bank where it earns interest. The bank now has exposure on both sides of its balance sheet. It has loaned money to the buyer of the cocoa futures and if UGH is forced to pay off on the crop insurance it has sold it would withdraw its deposits, forcing the bank to liquidate an asset to raise the cash. If UGH has sufficient reserves to pay its claims the worst the bank would suffer would be a reduction of its balance sheet. What if UGH could not pay its claims?

This is one of the few thoughts that can trouble a banker at three in the morning, a thought that will not be soothed by a cup of hot cocoa.

If UGH could not pay off, the bank would have to use its reserves (its capital) to pay its liabilities. The banker wonders if there might not be some way to 'hedge' his risk from a possible default by UGH. He remembers that there was some talk at the golf club about some young players who spent more time with their computers than with their girl friends who figured out how to make money selling insurance against defaults by companies such as UGH. If the price were right he might just buy some of that insurance from their company, AIP (usually pronounced ape, and often referred to as amalgamated illusions of protection).

All the parties in this loop of transactions are faced with the question of how to price the various risks. The one value to which all others must be linked is the value of the cocoa crop; the loss of that (real) value is what is at risk. Since there is a market for cocoa and a market for cocoa futures we are reassured that there is at least a process in place for determining the value that an economy places on cocoa. However, cocoa growing is a process that takes time and in that time between planting and harvesting any number of factors may change, for better or worse. What the insurer of the crop must do is make some sort of guess about what could go wrong. What if an accident happens to the grower? (Require accident insurance?) There is the weather. For any grower, weather is the biggest uncertainty. The insurer checks the records going back as far as possible. He looks for patterns in this record, wet years followed by dry years. How wet, how dry? So many variables, so much time. A pattern will emerge, not certain but probable. Averaged over enough years, the insurer calculates the loss that will have occurred under average conditions and sets the premium for any one year high enough to cover probable claims over some limited period of time; to earn enough in good years to pay off in the bad years.

Here I need to add to the discussion of probability that we began in Part III of this essay. There we observed that only in a fully constrained system do single cases approach average cases. In variable systems in which parts are interdependent (such as climate) we can only observe propensities where the risk attached to single cases is not correlated with averages. Every sequence of events in a variable system (say, wet years or dry years) must be understood as forming a part, a limited sub-set, of a larger sequence (say, warming or cooling) which affects the events in the smaller sequence. Here the correlation of single events with the probability of those events may be at such extreme intervals that no calculation is possible.

So here is the problem that the growers, the insurers and the banks must grapple with. (Idea for a new drink in these hard times: Grapple.) The problem is that the more improbable the event, the more difficult it becomes to price the risk attached to that event; but the potential gain or loss from the improbable event - owing to its very improbability, which means its potential for change - is very great.

If banks and insurers were to hold sufficient reserves for extreme occurrences they would make no money and none of us could afford insurance or loans. So the success of banking and insurance depends on finding the correct midpoint between average and extreme risk. Or making sure that someone else bears the cost of those natural or human disasters, the floods or panics or wars that wipe out not only cocoa crops but entire species and the worlds they created.

The price of risk is a peculiar sort of ratio. On one side of the ratio is a rate of time: an expected number of events per some period of time. On the other side is the expected gain or loss if the event does or does not occur. It is a peculiar price because at any given moment before the last moment it is 'wrong'. Up until the moment the cocoa crop is harvested we cannot know if the price of the insurance for crop failure was the right price. Until the buyer of the crop futures actually sells

the crop she cannot know if the price paid for the future crop was the correct price. (What if there was a sudden health scare attached to drinking cocoa?) There cannot be markets for all contingencies but there are markets for trading some risky contracts. The buyer of the cocoa futures may choose to sell her contract before maturity, either to realize a gain or minimize a potential loss. If the banker knows about these trades he may decide that his loan to the speculator is more or less secure and may drop his insurance (or increase it) with AIP or sell it to another speculator if there is market for it. The banker may also decide to increase his lending to speculators, thus producing another little 'goldmine' effect in the futures market.

Markets that trade contracts which involve risk trade as all markets do on the basis of differences. When it comes to risk the differences are those of expectations and information. Oddly enough, expectations and information sit on a teeter-totter of their own. I would like to quote Kenneth Arrow at some length on this point:

"It is a natural hypothesis that one cause of trading is difference of information. If I learn something that affects the price of a stock and others do not, it seems reasonable to postulate that I will have an opportunity to buy or sell it for profit. A little thought reveals that, if the rationality of all parties is common knowledge, this cannot occur. A sale of existing securities is simply a complicated bet, that is, a zero-sum transaction (between individuals who are identical apart from information). If both are risk averters they would certainly never bet or, more generally, buy or sell securities to each other if they had the same information. If they have different information, each one will consider that the other has some information that he or she does not possess. An offer to buy or sell itself conveys information. The offer itself says that the offerer is expecting an advantage to himself or herself and therefore a loss to the other party, at least as calculated on the offerer's information. . . It leaves as explanation for trade in securities and commodity futures only the heterogeneity of the participants in matters other than information." Which is to say, expectations.

According to the assemblers of risk models - those who insist that probabilities may be calculated - the more information one has about the distribution of events, the more reliable will be the model in predicting the risk of events. That may well be true; the only really reliable model is what actually happens. When it comes to *pricing* risk, however, we encounter what seems to be a paradox of information. The more information we have, which is to say, the more information we have in common, the less we will be disposed to trade on the basis of information. The value of information will be inversely proportional to its probability. (Look out for the rapture.)

We have heard much these days about 'toxic' securities which appear to be cast into some kind of market limbo, waiting for the prayers of the faithful to either lift them to paradise or leave them to be written off into nothingness. This limbo is the result of a massive market failure, the kind that comes when it is revealed that there are no differences in information or expectations that will lead anyone to trade. Without trades there will be no prices; without prices no one knows what these securities (?) are worth. Those intricate models of risk always assume there will be markets to provide prices. It turns out that when it comes to the future, a truly neutral market may be one in which no one trades.

Conclusion

We can now see that Bagehot was not quite correct. Bankers get rich having other people pay the banks for the use of money banks create. The limit to this process is the degree to which people are willing and able to pay for credit. Banks ought to keep reserves against that limit, but each bank is reluctant to forego profit so they look to others to provide reserves. The cost of that reserve should place some limit on credit creation but the true cost of that reserve can only be found

at the limit of necessity, at which point it is too late.

There can be two other limits to the risks which come from this virtually unlimited credit creation. One lies on the liability side of the balance sheet; deposits can be converted to cash and walk out the door. A sudden demand for 'walking around' money can force a bank to liquidate assets which means it must find another bank to buy the asset for cash. Here is where the predicament known as the fallacy of composition (that what is true of the part must be true of the whole) comes to bite. A single bank may increase its liquidity only if another bank is willing and able to reduce its own liquidity. All the banks cannot do so at the same time. Money which leaves the system, say by persons wanting to convert dollar assets into euro assets, forces the system as a whole to liquidate assets. This process can force down the price of assets, which in turn may lead to insolvency.

A liquidity crisis can only be stopped when assets which are not someone else's liability can be converted to cash. This assumes there will be a market which will provide a price for the assets to be liquidated. In the old days a specified quantity of gold supplied that price. Gold reserves sat on the asset side of a bank's balance sheet and could be converted to cash without calling in a loan (or selling paper in the market). Now the only asset that is not someone else's liability that can be converted to cash is a government bond. Except that it is actually *everyone's* liability. This is a useful illusion which we fail to notice until the "asset" starts to acquire many zeroes in its denomination.

The price of a government bond is its forward price which is determined by the interest rate fixed by the central bank on the reserves which it holds for the banking system. If a rate is fixed, adjustment must be made through a change of time periods or quantities. The central bank fixes the rate of interest on bonds by the amount it buys or sells to the financial system. To lower the interest rate, the bank must buy increasing amounts of government securities. These "assets" are the liability of the government, that is, everyone. Is this not somewhat circular? Why would I want to hold an asset which is also my own liability? Leverage, I suppose. Relative to what I hold as an asset, my liability in the bond is very small. The main point is my assumption that I can, along with my fellow savers, force the government to pay up when the time comes. Which will require the consent of everyone else. As professors in law schools sometimes say on the first day of class: look at the persons on each side of you. One of you is not going to make it.

The other limit to credit creation by the banks is to reduce the role of banks as intermediaries. Why do not cocoa growers make enough profit from selling cocoa that they need not borrow from banks to finance their next crop? Or, given that the crop can be sold forward, do not the speculators in cocoa futures make enough profit to finance their own future speculations? Why do our efforts not produce sufficient return to pay the cost of more effort which could return even more? Why are we always in debt?

This is a puzzle, at least it is to me, for which there seems to be no easy answer. In a future essay I will try to pursue this puzzle a little further. Some of it has to do with missing markets. We need markets to exchange, not just cocoa and houses, but to sort out the implications of information and expectations about cocoa and houses. Information is always about what has already happened. Whatever it was, the crop failure, the termites, the flood, it's happened. What did we expect? Expectations are as numerous and varied as the number of individuals who have them. Our expectations are what prepare us to cope with what may come; to direct our effort to building the ark before the flood. Yet we do not know how to value our expectations until the information arrives to say yes, you were right; or no, you screwed up. Value always sits on a teeter-totter. Perhaps there will be a later occasion when we can discuss what happens when the fulcrum is moved to change the potential of one side or the other of the see-saw. With enough leverage, we could have lift-off. As

Dimitri Martin said about childhood, if you have a fat friend, there are no see-saws. Only catapults.

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