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WHEN ARE INTEREST RATES EXOGENOUS?

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Perhaps the most important of Basil Moore's contributions to economic theory is the recognition that the money supply should be treated as an endogenous variable while the interest rate should be taken to be exogenous. The first proposition seems to have been accepted by virtually all Post Keynesians, while the second was—at least initially—seen as more problematic. Indeed, something of a controversy developed around the proposition that “the” interest rate is exogenously administered by the central bank, briefly resulting in two “rival” approaches: the “horizontalist” approach developed by Moore and the “structuralist” approach associated with Tom Palley and Bob Pollin (among some others). For the most part, I believe this particular debate was at best a result of misunderstanding, and I wish it had died a more timely death. I hope the audience will be relieved to hear that I am not going to dredge those murky waters—I'd rather watch paint dry than sit through yet another attempt to explicate and synthesize horizontalism and structuralism.

Still, there are several issues surrounding interest rate exogeneity that are worth exploring. First there is the question of what we mean by the term exogeneity. I will dispense with that rather quickly by adopting the usual definition that identifies exogeneity with ability of the monetary authorities to “administer” “the” interest rate—although I will explain why that is somewhat problematic. Second, and following directly from that question, we need to consider which interest rate(s) is(are) directly administered by policy. Third, we need to determine whether this interest rate exogeneity is in some sense “natural”, or, does it follow from particular institutional arrangements (including, perhaps, policy adopted by the central bank)? Relatedly, does interest rate exogeneity apply over all stages of the business cycle? Finally, we will examine implications arising from adoption of an exogenous interest rate for two theories that have traditionally played an important role in much Post Keynesian research: Keynes's liquidity preference theory, and Minsky's financial instability hypothesis.

Exogeneity

The term exogeneity is used in two or three quite different ways. (Desai 1989; Wray 1992; Cooley and LeRoy 1981) The most common use (at least by Post Keynesians) is in the control sense: an exogenous variable is one whose value is set by government policy. Moore prefers to use the term “administer” to indicate that policy makers change their interest rate target in reaction to economic outcomes and policy goals. The second sense in which the term is used is in the theoretical or causal sense: the exogenous variable in a model is assumed to cause changes in the endogenous variables. A strongly exogenous variable is independent of all endogenous variables in a model (including current and lagged values of these variables); a weakly exogenous variable can be defined as one

whose value is independent of the contemporaneous values of the endogenous variables, but may depend on lagged values of these variables. Note that an exogenous variable in the control sense is not necessarily exogenous in the theoretical sense because policy makers may choose the target for that variable based on values of the endogenous variables. Indeed, any plausible theory of interest rate setting by the central bank would include a reaction function to make the interest rate at least weakly endogenous in the theoretical sense. Finally, we could define statistical exogeneity as a case in which the variable is independent of all the unobserved explanatory variables of a tested model—a condition that is required to generate unbiased estimates of coefficients. This is important for empirical tests, but is surely impossible to meet in the case of administration by the central bank of the interest rate(s). In what follows we will generally use the term in the control sense, however, we will note that this becomes problematic, particularly when we discuss exchange rate regimes.

Which interest rates are exogenous?

Moore convincingly argues that the central bank exogenously administers the overnight inter-bank lending rate (fed funds rate in the USA). Once it sets a rate target, it has no choice but to accommodate “horizontally” the demand for reserves. This has raised two objections. First, some have argued that this is no different from the usual orthodox exposition of monetary policy as a choice between targeting reserves or targeting the interest rate: if the central bank chooses an interest rate target, it loses control over reserves. However, it is supposed that the central bank *could* choose a reserve target and hence hit money targets. Moore’s response has been that the central bank actually must accommodate the demand for reserves, but can choose a different interest rate target. Hence, *if* the central bank can indeed hit a reserve target, it does so only through its decision to raise or lower the interest rate to lower or raise the demand for reserves. Thus, the supply of reserves is best thought of as wholly accommodating the demand, but at the central bank’s interest rate target.

This leads to the second question: why does the central bank necessarily accommodate the demand for reserves? We can identify at least four different answers that have been given. One of the earliest was provided by Moore’s masterful analysis of lagged and contemporaneous reserve accounting. As it turns out, both methods result in a backward looking reserve requirement: the reserves that must be held today depend to a greater or lesser degree on deposits held in the fairly distant past. As banks cannot be expected to go backward in time, there is nothing they can do about historical deposits. Even if a short settlement period is provided to meet reserve requirements, the required portfolio adjustment could be too great—especially when one considers that many bank assets are not liquid. Hence, in practice, the central bank automatically provides an overdraft—the only question is over the “price”, that is, the discount rate charged on reserves. A second, less satisfying, answer is often given, which is that the central bank must operate as a lender of last resort, meaning that it provides reserves in order to preserve stability of the financial system. The problem with this explanation is that while it is undoubtedly true, it applies to a different time dimension. The central bank accommodates the demand for reserves day-by-day, even hour-by-hour. It would presumably take some time before

refusal to accommodate the demand for reserves would be likely to generate the conditions in which bank runs and financial crises begin to occur. Once these occurred, the central bank would surely enter as a lender of last resort, but this is a different matter from the daily “horizontal” accommodation. The third explanation is that the central bank accommodates reserve demand in order to ensure an orderly payments system. This might be seen as being closely related to the lender of last resort argument, but I think it can be more plausibly applied to the time frame over which accommodation takes place. Par clearing among banks, and more importantly par clearing with the government (see below), requires that banks have access to reserves for clearing. The final argument is that because the demand for reserves is highly inelastic, and because the private sector cannot increase the supply, the overnight interest rate would be highly unstable without central bank accommodation. Hence, relative stability of overnight rates requires “horizontal” accommodation by the central bank. In practice, empirical evidence of relatively stable overnight interest rates over even very short periods of time supports the belief that the central bank *is* accommodating *horizontally*.

We can conclude decisively that the overnight rate is exogenously administered by the central bank. What about other rates? Short-term sovereign debt is a very good substitute asset for overnight reserve lending, hence, its interest rate will closely track the overnight interbank rate. Longer-term sovereign rates will depend on expectations of future short term rates, largely determined by expectations of future monetary policy targets. Thus, we can take those to be mostly exogenous in the control sense because the central bank could announce its intended targets far into future and thereby affect the spectrum of rates on sovereign debt.

According to Moore, the retail bank lending and deposit rates are determined by mark-ups and mark-downs. Given market power, banks set retail loan rates (as price-setters) as a mark-up over the central bank’s interest rate target, and then satisfy all loan demand “horizontally” at that rate (as quantity-takers). Similarly, they are price-setters and quantity-takers in retail deposit markets as they mark-down the targeted interest rate. Wholesale markets (brokered deposits) are competitive and are used by individual banks to compensate for any asymmetry in their ability to make loans or retain retail deposits. Here, banks are quantity-setters and price-takers. Finally, allowance is made for adjusting of interest rates to account for risk differentials. Once a bank has established risk weightings, it supplies loans “horizontally” at an “administered” loan rate that is itself a mark-up over the central bank’s “administered” overnight interbank lending rate target.

Whether retail loan rates and deposit rates should be considered “exogenous” in the policy control sense depends on behavior of the mark-up. If the mark-up does not vary with central bank policy, itself, and is known, then the central bank could, trivially, raise the loan rate to hit any higher rate target (for a risk class) by raising the overnight rate target. If the mark-up varies through time—perhaps due to macro or micro conditions—then exogenous “administration” of loan rates becomes more problematic, but might be managed with some slips ‘twixt lip and cup’. There is also an obvious asymmetry: the central bank can raise loan rates, but its ability to lower them is limited by a zero overnight interbank lending rate (if banks want a mark-up of 400 basis points, the loan

rate cannot be pushed below 4%). In this case, the central bank's ability to exogenously "administer" loan rates is limited because it cannot push them down once a zero overnight rate is reached.

At least some of the criticism of Moore's framework has been based on the argument that the mark-up depends on the state of the macroeconomy (for example, the stage of the business cycle) and also on the balance sheet positions of the lending bank and its borrower (which, again, may vary temporally). It is true that Moore does not deny that the mark-up might be variable—and I am sure he will agree that it can vary over the cycle—rising with pessimism and falling with optimism. This could even be seen as a reclassification of risks—borrowers that used to receive loans on the basis of a 200 bp mark-up now are charged 400 bp because risks have risen. If I dared to venture into the horizontalist-structuralist debate, I would note that structuralists (wrongly) sought to refute a horizontal loan supply curve on the argument that over an expansion interest rates tend to rise because mark-ups rise as perceived risks grow. But I won't go there because Moore's horizontal loan supply curve is at a point in time, while theirs is a plot of interest rates over time. Moore's horizontalism is not inconsistent with a rising mark-up over time as risks in the economy increase, and the structuralist concern with innovation and evolution of practice can be incorporated within Moore's framework. As we will see in the final section, the point that Hyman Minsky had tried to make is that over an expansion, and under some conditions, the balance sheets of both borrowers and lenders can become "stretched" in such a way that loan rates tend to rise; this can be construed as either an upward sloping trend or as shifts due to rising risk.

What I do believe to be somewhat more problematic is the vision of a perfectly elastic supply of credit at the marked-up loan rate. It is true that households hold credit cards with pre-approved lines of credit up to some limit at a fairly constant cost (fees and interest rate); utilization of these lines up to those limits would almost certainly impact rates and fees charged on additional borrowing, but this can be attributed to movement into a higher risk class. Firms also negotiate credit lines that typically trigger higher fees and rates as they are utilized, but this, too, can be seen as transition to riskier classes. Commercial loans (and mortgage loans) require individual negotiation, with loan quantities and uses carefully established at the time interest rates are quoted. The firm must meet very specific performance requirements to continue to draw upon the loan. Further, loan (and mortgage rates) can be partially or even mostly variable rate (depending on institutional arrangements). In these cases, it is difficult to see what it means to say that the supply of loans is "horizontal", except that the lender will supply credit at the negotiated rate and up to the negotiated limit—with borrowing that might take place later and beyond that limit to be subject to another rate that will be either negotiated at that time, or fixed as some mark-up over a future prevailing rate that is currently unknown.

I think that Moore's important contribution was the recognition that loans are not reserve constrained and that they are made at a negotiated, or "administered", rate. There is thus no *necessary* relation between the quantity of loans made and the interest rate charged. In that sense, the loan rate is "exogenous", although this is not one of the usual definitions

of the term. Further, any impact that the central bank might have on the loan rate comes through its overnight interest rate target and not through manipulation of the quantity of reserves. So, again, the rate is “exogenous” of quantity, although it is not likely to be exogenous in the theoretical sense.

The claim that reserves are supplied “horizontally” at the rate set by the central bank is, I think, beyond dispute. Reserves cannot be the “raw material” from which loans are made, and it is more appropriate to see reserves as the result of loan-making activity. Because bank deposits are created with loans, they cannot be treated as part of the loan-making “production function”, either. Hence, both ISLM and loanable funds approaches to “endogenous” interest rate determination must be abandoned. These are the critical insights that follow from Moore’s work, regardless of how one interprets the exogeneity of interest rates.

When are interest rates exogenous?

It is apparent that Moore’s exogenous interest rate approach relies on accommodative central bank behavior. From this, we can presume that interest rate exogeneity requires certain institutional arrangements. In this section we will explore the conditions in which (at least some) interest rates are exogenous.

Both Vicky Chick and Moore (as well as Chris Niggle) have advanced an “evolutionary” or “stages” approach to endogenous money, according to which money has become endogenous only relatively recently. For Chick, this depends on the level of development of the banking sector; for Moore it depends on the existence of a central bank that accommodates the demand for reserves. This has been called “institutional endogeneity”, contrasted with “natural endogeneity” adopted by many circuitists (more properly called “logical endogeneity”). I prefer to locate the origins of endogenous money in the distant past, probably some short time after the origins of “state money” that Keynes dated to 2000 B.C. (but more recent historical research would probably push that date back another thousand years or more). Similarly, and logically following from his views on the nature of the endogeneity of money, Moore would seem to locate the origins of exogenous interest rates in the rise of accommodative central banks. Again, I would want to push this much farther back: Michael Hudson has demonstrated to my satisfaction that interest rates were exogenously administered in ancient Mesopotamia (and the monumental work by Homer and Sylla would seem to confirm very long periods of stability of rates at other times and in other places that is consistent with the view that rates have long been exogenously “administered”). Paradoxically, I would not agree with Moore that interest rates have been exogenous in the US since the founding of the Fed in 1913—rather, I would argue that US interest rates were endogenous from 1913 to the breakdown of Bretton Woods, and that the overnight rate has since been truly exogenous in the control sense. The key institutional arrangement determining exogeneity, that has been important since 1913, is the exchange rate regime.

In modern economies, the banking system operates as an agent of government, as almost all government payments and tax receipts flow through banks. In a floating rate regime,

the government that issues the currency spends by crediting bank accounts. Tax payments result in debits to bank accounts. Deficit spending by government takes the form of net credits to bank accounts. Operationally, the entities receiving net payments from government hold banking system liabilities while banks hold reserves in the form of central bank liabilities (we can ignore leakages from deposits—and reserves—into cash held by the non-bank public as a simple complication that changes nothing of substance). While most Post Keynesian explications of horizontalism focus on central bank provision of reserves as part of monetary policy, actually net injections of reserves that accompany fiscal policy easily swamp this (for example, in the USA this year the treasury's operations will result in \$500 billion of net injections to bank deposits and to reserves held at the Fed). It is quite remarkable—at least to me—that \$500 billion of net injections of reserves by the treasury is routinely ignored by Post Keynesian monetary theorists, whose whole attention is absorbed by the relatively miniscule (and purposely temporary) operations of the central bank. Further, many economists (including Post Keynesians) find the coordinating activities between the central bank and the treasury quite confusing. I want to leave those issues mostly to the side and simply proceed from the logical point that deficit spending by the treasury results in net credits to banking system reserves, and that these fiscal operations can be huge.

If these net credits lead to excess reserve positions, overnight interest rates will be bid down by banks offering the excess in the overnight interbank lending market. Unless the central bank is operating with a zero interest rate target, declining overnight rates trigger open market bond sales to drain excess reserves. Hence, on a day-to-day basis, the central bank intervenes to offset undesired impacts of fiscal policy on reserves when they cause the overnight rate to move away from target. The process operates in reverse if the treasury runs a surplus, which results in net debits of reserves from the banking system and puts upward pressure on overnight rates—relieved by open market purchases. If fiscal policy were biased to run deficits (or surpluses) on a sustained basis, the central bank would run out of bonds to sell (or would accumulate too many bonds, offset on its balance sheet by a treasury deposit exceeding operating limits). Hence, policy is coordinated between the central bank and the treasury to ensure that the treasury will begin to issue new securities as it runs deficits (or retire old issues in the case of a budget surplus). Again, these coordinating activities can be varied and complicated, but they are not important to our analysis here. When all is said and done, a budget deficit that creates excess reserves leads to bond sales by the central bank (open market) and the treasury (new issues) to drain all excess reserves; a budget surplus causes the reverse to take place when the banking system is short of reserves.

Bond sales (or purchases) by the treasury and central bank are, then, ultimately triggered by deviation of reserves from the position desired (or required) by the banking system, which causes the overnight rate to move away from target (if it is above zero). Bond sales by either the central bank or the treasury are properly seen as part of monetary policy designed to allow the central bank to hit its target. This target is exogenously “administered” by the central bank. Obviously, the central bank sets its target as a result of its belief about the impact of this rate on a range of economic variables that are included in its policy objectives. In other words, setting of this rate “exogenously” does

not imply that the central bank is oblivious to economic and political constraints it believes to reign (whether these constraints and relationships actually exist is a different matter).

This discussion applies to nations in which the government issues a currency in a floating exchange rate regime. A country that pegs its currency to a foreign currency or precious metal operates in a quite different interest rate environment, however, with constraints on both fiscal and monetary policy. If a government promises to redeem its currency for another currency, or for a precious metal, it must retain sufficient reserves of that currency or metal to meet all conceivable requests for conversion. This could require reserves equal to, or even greater than, the total stock of domestic high powered money. Government budget deficits are then quite dangerous unless a trade surplus can keep the foreign currencies, or precious metals, flowing into official reserves. More relevantly for this paper, interest rates become endogenous in the sense that monetary policy must discourage redemption of domestic currency assets for foreign currency or precious metal. Further, a looser fiscal policy must almost necessarily be offset by a tighter monetary policy (higher rate target) unless the country enjoys a sufficient trade surplus. If private banks offer convertible accounts, they must retain sufficient reserves to meet conversions. Note also that central bank policy will tighten in crisis, just as the Bank of England used to raise rates and call in loans whenever there was a run on private banks during the nineteenth century. Accommodative behavior of the central bank operating in a fixed exchange rate regime is dangerous because it places the country's reserves of foreign currency or metal at risk. Thus, the Fed's timid response to the Great Depression, and its raising of rates in the accompanying financial crisis were appropriate while the country was on the gold standard.

Note that government bond sales by a nation operating on a fixed exchange rate can be thought of as something like a borrowing operation, a part of fiscal policy. If the government issues bonds denominated in the foreign currency reserve, it obtains reserves it can leverage in its deficit spending. If it borrows in its own currency, it destroys domestic currency that leveraged its foreign currency reserves and that could have been converted to drain those reserves. By contrast, a sovereign government on a floating exchange rate simply credits bank accounts when it spends; bond sales merely drain excess reserves to maintain overnight rates on target. Much of the "conventional wisdom" about fiscal policy applies only in the case of a fixed exchange rate regime. In such a regime, rising deficits will increase interest rates, not automatically as government borrowing "competes" with private borrowing, but because the central bank will raise its target rate to protect reserves on a fixed exchange rate regime. Government appears to face a "government budget constraint": its spending is constrained by the sum of new debt issues, new money creation, and tax revenues. Taxes result in a currency drain that reduces leverage ratios on reserves of foreign currency or precious metal; while taxes don't really "pay for" the government spending, they loosen the reserve constraint on spending. Issues of bonds also drain currency, substituting an interest-earning government liability for non-earning reserves. At best, they simply push possible conversion of domestic currency to the reserve into the future. Hence, new issues will likely cause the central bank to raise interest rates to protect reserves. Finally,

government spending financed by money emission increases leverage ratios on reserves, so will likely cause the central bank to raise rates for reasons just discussed. Thus, there is a reason to focus on the “constraint” that governments face on fixed exchange rate regimes, and reason to believe that deficits raise interest rates and threaten the value of the currency. If the deficit causes exchange rates to depreciate, inflation would be a possible result. Thus government deficits are more-or-less correctly “fought” by higher interest rates to protect reserves of foreign currency or metals.

By contrast, a sovereign government that issues a non-convertible currency on a floating exchange rate lives in a different environment. The “government budget constraint” is nothing but an *ex post* identity that in no way constrains government spending. Government spends by crediting bank accounts; taxes drain bank accounts; deficits mean net credits to accounts. Even in this case, one can think of these net credits to bank accounts as a “leverage” of reserves. However, because government does not promise to convert high powered money reserves to foreign currencies or metals, it can always supply domestic currency reserves “horizontally” on demand. Bonds are still issued to drain excess reserves, but the interest rate target is exogenously set and that target rate *need not* be raised by the central bank in response to government deficits.

The argument that interest rates become endogenous on a fixed exchange rate is more than mere semantics, even though we have admitted earlier that central bank policy never completely ignores economic conditions. Hence, it is true that even a central bank in a floating rate regime might pay attention to exchange rates and will take potential impacts on them into account when setting the overnight rate target. However, with a fixed exchange rate regime, the imperative of operating policy to ensure exchange rate rigidity becomes over-riding—the central bank simply cannot ignore forces that threaten the peg. Monetary policy is held hostage to the exchange rate such that the interest rate target can be considered to be endogenous—determined by what is thought necessary to protect reserves of foreign currency and metals. A central bank operating in a floating exchange rate regime might choose to raise target rates in response to treasury deficits, and it might even believe that this policy protects the exchange rate, but such behavior is not required in such a regime. The floating rate provides an additional degree of freedom to monetary policy that is not available in a fixed exchange rate system.

Keynes’s liquidity preference theory

There have been a number of claims that Keynes’s liquidity preference theory is inconsistent with both endogenous money and exogenous interest rate setting by the central bank. I believe that such claims result from a misinterpretation of Keynes’s version of liquidity preference theory. While liquidity preference theory is often presented as a theory of demand for money (even occasionally by Keynes himself), the best expositions of Keynes’s theory (in Chapter 17 of the *General Theory*, in Keynes’s 1937 article, “Alternative theories of the rate of interest”, and in Townshend’s 1937 “Liquidity-premium and the theory of value”) present it as a *general* theory of asset prices. When interpreted in this manner, liquidity preference theory is perfectly consistent with endogenous money and exogenous interest rate setting.

Let us take the most extreme form of horizontalism: the overnight rate as well as bank loan and deposit rates are all exogenously administered by central bank policy. Further, let us suppose that short-term government bond rates are similarly administered by the central bank while long-term government bond rates are simply set by expectations of future central bank policy. Does liquidity preference theory have any role to play in such a model of interest rate determination? Recall that in Chapter 17, Keynes argued that each asset has an expected return, comprised of $q-c+l+a$, where q represents the expected yield of the asset, c is wastage or carrying cost, l stands for liquidity, and a is the expected appreciation/depreciation of the price of the asset in money terms. According to Keynes, most of the return to highly liquid assets comes from the l (and c would be negligible), while for capital assets, most of the return would consist of the expected q s. As liquidity preference falls, the demand price for assets whose return consists primarily of l will fall relative to the value of assets whose return consists primarily of q . Under the assumptions of extreme horizontalism, this analysis does not apply to the overnight rate, to loan and deposit rates, and to government bond rates—whose rates and hence prices are all exogenously administered. Still, this leaves a great range of assets whose prices are in part determined by liquidity preference.

Note that Keynes did not mean to imply that liquidity preference is the *only* factor determining asset prices, indeed, it cannot be but one among a number of other factors. Among these factors we should include monetary policy and expected future interest rate targets. Keynes singled out for analysis liquidity preference because of the special role played by money, which has “peculiar” properties—one of which is that it is usually the most liquid of assets. There are parts of Keynes’s exposition that should be altered in recognition of abandonment of fixed exchange rates and (re)emergence of exogenous overnight interest rates. However, the argument that when uncertainty about economic prospects rises, demand prices of illiquid capital assets tend to fall relative to those of liquid financial assets surely applies even with floating rates and exogenous administration of some interest rates.

Immediately after the GT was published, there were attempts to reconcile his liquidity preference approach with the loanable funds theory of orthodoxy, principally by Ohlin, Hicks, and Robertson. Keynes vehemently rejected all such efforts, but after his death “synthesizers” like Tsiang and Kohn continued to argue that saving and investment flows, and corresponding “flows of finance”, should be combined with demands for and supplies of stocks of money hoards to determine interest rates. (See Foley for the more-or-less definitive study of the relations between stocks and flows.) In recent years, some Post Keynesians, have argued that the liquidity preference approach is close to—or perhaps is the same thing as—loanable funds theory. This has carried over into a critique of Hyman Minsky’s work, which some followers of the Circuit approach have argued is also based on a loanable funds approach. I think all of this represents a fundamental conflation of liquidity preference theory with traditional “money demand” theory, and a misunderstanding of the impact of balance sheet positions on behavior.

Minsky’s financial instability hypothesis

The critique of Minsky begins with a few well-chosen quotes from his earliest writings in which he appears to confuse saving and finance and money; it is then claimed that Minsky held a loanable funds approach and hence his financial instability hypothesis developed over the subsequent four decades is flawed. Some have also denied that it is even possible for balance sheets to become stretched or for income flows to be “leveraged” in the manner Minsky described, instead advancing a sort of “Say’s Law” of finance. In this view, no matter how hard economic units try to get themselves into debt, offsetting financial wealth is created along with the profits generated by their spending—hence, hedge units cannot become speculative or Ponzi, in Minsky’s terminology. Because liquidity cannot be reduced, liquidity preference plays no role in determining interest rates/asset pricing, thus, Minsky’s “two price theory” of investment is as flawed as Keynes’s liquidity preference theory.

Using a very simple circuit model with no government and no foreign sector, and—importantly—with no money other than “inside” credit (bank deposits created through loans) it is identically true that expansion of nonbank liabilities equals nonbank financial assets, hence, at any point in time all loans and deposits can be retired. In such a simple model, it is not possible or even desirable to make a sharp distinction between stocks and flows—at the beginning of the circuit, loans advanced equals deposits created, equals the wage bill paid, equals income. Spending on output is counted as part of the reflux process, allowing firms to retire loans and extinguish deposits; any wage income not yet spent equals saving, equals deposits, equals “money hoards”, equals loans not retired. The circuit is closed when all income is finally spent, all deposits and loans are destroyed, and all saving and money hoards are eliminated. If the circuit is not closed, some saving in the form of deposits remains, but this exactly equals loans that were not repaid. Saving cannot be a net source of finance, for it simply represents income and deposits that did not reflux. Aggregate liquidity cannot be stretched since it is created with the payment of wages, thus equals income and remains only to the extent that there is positive savings—which can take place only in money form. There is no “outside” money to leverage, and all “inside” money “leverages” actual production (equals income).

While the model is extremely useful for making these points, and for providing one possible avenue toward development of a monetary theory of production, it is not very useful for explaining the evolution of balance sheets through time in a more complicated economy with several sectors and with finance of long-lived capital equipment in an uncertain world. This was Minsky’s central concern for some four decades, during which he developed an increasingly sophisticated model of the transformation of financial positions toward greater fragility. His earliest work focused on evolution of banking system balance sheets as innovations encouraged banks to shift portfolios toward more illiquid assets. One of the consequences was a nearly continual increase of the deposit (or loan) to reserve ratio—a leveraging of “outside” money in a hierarchical money system—as well as a decrease of the loan (or deposit) to government bond (“secondary reserves”) ratio. This is one aspect of the rising “fragility” of the financial sector that Minsky continued to analyze as each new financial innovation brought new ways to stretch liquidity.

During the early 1960s, Minsky recognized that the impact of expansion on private nonbank balance sheets depends on the nature of the expansion. If the expansion is fueled mostly through government deficits, then private sector net indebtedness need not increase at all; however, a private-sector led expansion could result in an increase of net indebtedness of that sector: “During a protracted expansion dominated by household and business deficits the ratio of household and business financial commitments to income rises, whereas in an expansion dominated by government deficits the ratio of private commitments to income decreases.” (Minsky 1963, p. 412) Unlike the results from the simple circuit model, Minsky recognized that while it is true that at the global level, all debts and credits cancel, this is not true for individual sectors—which can be net creditors or net debtors. Many will recognize this as the sectoral analysis that is most closely associated with Wynne Godley today. Hence, an expansion can occur with the private sector running a surplus, a deficit, or a balance between its income and spending—and this is important for fragility. For a country like the USA, robust expansion almost automatically dictates that the private sector’s balance will deteriorate as the government’s budget moves toward balance (even to surplus during the Clinton years) and as a large balance of payments deficit opens up with the rest of the world. Hence, the Say’s Law Post Keynesians have simply neglected to incorporate sectoral analysis into their model, and their critique of Minsky cannot hold. Further, Minsky recognized that economic agents incur debts to take positions in assets, and that purchase of assets need not generate a new income flow out of the productive sector. Such a possibility is not allowed in simple circuit models, in which loans and deposits are created only in conjunction with production. However, in the type of capitalism that Minsky modeled, a very large part of the financial superstructure is removed from production so that the volume of financial assets and liabilities can grow relatively to the underlying incomes generated in the production process—another kind of leveraging that increases fragility and that breaks the Say’s Law of Finance.

In preparation for his *John Maynard Keynes* book that eventually came out in 1975, Minsky very carefully re-read the GT (his extremely detailed notes are archived at the Levy Economics Institute). This not only resulted in a reinterpretation of Keynes, but also in a major revision to Minsky’s own exposition of his theory of investment and evolution of fragility. In his writings of the 1950s and through most of the 1960s, one can indeed find some passages that appear to indicate he had not fully incorporated Keynes’s theory of the saving-investment relation within his own vision. In my view, his early work is still very valuable for the numerous insights into financial markets, and there is no doubt that he held an endogenous money view from the beginning. Still, one can see an obvious difference in his work after 1970. Further, shortly after writing the JMK book, Minsky “discovered” Kalecki (he had almost certainly read Kalecki two decades earlier, although the profits equation does not appear in his earlier writing). Addition of Keynes and Kalecki led to a great improvement of the financial instability hypothesis.

Minsky termed his a “financial theory of investment and an investment theory of the cycle”. Briefly, bank loans provide short-term financing of the production of investment goods and consumption goods; consumption out of the wage bill received by investment

goods sector workers generates profit income flows in the consumption sector. Firms ordering the investment goods must obtain long-term finance for their position in these assets; they use a combination of internal funds (gross capital income flows, generated as above by consumption of investment sector workers) and external funds. The “supply” of internal funds is “horizontal” (at the supply price of capital goods), but the “supply” of external funds is upward sloping due to lender’s risk. This has nothing to do with loanable funds, but rather can be attributed to hesitation of lenders to take increasingly large positions in the liabilities of each particular firm—and in liabilities of firms in general. While Minsky uses the term “risk” he does not mean this in the Knightian sense; rather the future is uncertain in a Keynesian sense, but financial institutions (and their borrowers) operate conventionally, with rules of thumb, on whirlwinds of optimism and pessimism. Similarly, the prospective investment goods purchasers must estimate future returns from the capital goods; the demand price is horizontal so long as internal funds can cover the cost. When external funds are involved, borrower’s risk is built-in, lowering the price the prospective borrower is willing to pay.

The intersection of demand price and supply price determines the quantity of investment undertaken, which in turn determines the amount of external finance required and the contracted commitments made. Rejecting the “Financial Say’s Law”, Minsky argued that these investment decisions could result in rising fragility as greater portions of expected income flows became committed (in advance) to debt service. Further, as mentioned above, Minsky recognized that firms and other economic units take positions in assets by issuing liabilities and there is no necessary relation between the value of assets and the size of income flows generated in the production process. Over an expansion, balance sheets move from hedge to speculative and to Ponzi as the committed debt service rises relative to prospective income flows. If income flows turn out to be less than expected, or if finance costs rise, this “normal” and discretionary transformation to fragile positions would be hastened. Note also that if expansion tends to generate budget surpluses or balance of payments deficits, the aggregate budget situation of the private sector must (identically) worsen. In any case, because financial institutions live in the same expectational environment (more or less) inhabited by everyone else, a reversal of expectations about the future (regardless of current realized results) could indeed change perceptions of lenders’ and borrowers’ risk in such a way that external finance costs rise, investment spending falls, profits and other incomes fall, and a snowball of defaults could result. Again, this has nothing to do with “lack of saving” but simply results from adoption of a more complex vision of capitalist finance than that incorporated in the simplest circuit models.

While Minsky’s work would cause us to reject simplistic Financial Say’s Laws, is it necessarily inconsistent with horizontalism and exogenous interest rate administration by the central bank? Let us again take the most extreme form of horizontalism: the overnight rate as well as bank loan and deposit rates are all exogenously administered by central bank policy. Further, let us suppose that short-term government bond rates are similarly administered by the central bank while long-term government bond rates are simply set by expectations of future central bank policy. Those who advance a Financial Say’s Law appear to want to go further, to deny any endogenous impacts on *any* interest rates or on

any financial asset prices, but such a position is not inherent to the horizontalist approach, in which even the extreme position is simply that loan rates, deposit rates, and sovereign bond rates are exogenous. (Note that Minsky's theory of investment finance really does not involve Moore's loan rates in any case, because the "two price theory" of investment concerns long-term external finance supplied by investment banks, and not by commercial banks. Commercial banks provide only the short-term "working capital" loans used during the production of investment goods, hence go into the "current output" horizontal supply price, but do not play a role in formation of the "lender's risk" that causes the supply price to rise.)

Over the course of an expansion, the central bank normally begins to increase its administered target rate to prevent what it sees as "overheating". This raises the costs of finance and can, as Minsky argued, lead to "present value reversals" in the sense that projects that had been profitable at lower costs now become unprofitable. Firms must decide whether to continue production of projects already underway, absorbing sunk costs and taking a loss, or to abandon projects. The rate of spending on new investments declines, lowering profit flows and making it more difficult to service previously incurred debts. Financial problems arise even if the bank loan supply is horizontal at the new higher interest rates targeted by the central bank.

Increases to the central bank's target rate will be passed along to bank borrowers on new loans and on all adjustable rate loans. As discussed above, we do not even need a change of monetary policy to have rising finance costs, so long as an expansion pushes borrowers into higher risk classes. This can occur for micro reasons (larger outstanding loans to individual borrowers raise risks) and for macro reasons (bank loans as a percent of total assets rise, especially relative to "secondary reserves" like government bonds—a necessary result if the expansion is led by the private sector; bank loans as a multiple of equity also rises, except in the simplest "Financial Say's Law" models). Thus, interest rates can tend to rise as the financial structure becomes more fragile. The supply price of investment goods rises, while demand prices fall as greater borrower's risk is recognized. Again, if an expansion is led by the domestic private sector, its spending must increase faster than its income, putting borrowers into increasingly precarious positions. None of Minsky's analysis requires an exogenous money supply, or a loanable funds approach. The financial instability hypothesis survives even in the most extreme version of horizontalism.

Conclusions

Moore's critical insight is that the supply of reserves should be modeled as horizontal at the administered overnight interest rate. The supply of bank money should be taken to be endogenous, with demand deposits created each time a bank makes a loan. If required or desired reserves rise in consequence, the central bank accommodates by providing more reserves. Loanable funds theory, according to which savings are the supply (or a portion of the supply) of the funds required to meet the demand for loans must be rejected. Just as investment spending creates an equivalent amount of saving flows, bank lending creates an equivalent amount of bank deposits. Similarly, ISLM analysis and the simultaneous

determination of equilibrium interest rates and income must be rejected because it presumes an exogenously-determined money supply. There cannot be any automatic and necessary impact of spending on interest rates because loans and deposits can and normally do increase as spending rises. The overnight rate will change only if and when the central bank decides to allow it to do so. Short-term loan and deposit retail rates can be taken as a somewhat variable mark-up and mark-down from the overnight rate. None of this precludes a role for Keynes's version of liquidity preference as a theory of asset prices, with liquidity preference as one of the components that goes into determining interest rates that are not administered by central bank policy. Finally, none of this is inconsistent with Minsky's financial instability hypothesis according to which expansions and evolution of financial practices tend to stretch liquidity and create a fragile financial structure more vulnerable to financial crises—even in a world of endogenous money, horizontally supplied reserves, and exogenously administered overnight rates.

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