FREE BANKING AND THE STRUCTURE OF PRODUCTION: A CONTRAST OF COMPETING BANKING SYSTEMS

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Introduction

THE PURPOSE OF THIS NOTE is to apply an argument developed in Hülsmann (2009) to a claim used in advocacy of fractional reserve banking (FRB) under a system of free banking (that is, a system of banks lacking any formal, central control [as characterizes the state-monopolized central banking systems of the modern Western world]). Hülsmann considers the effects on the structure of production of changes in the *demand* for money, under two contrasting monetary systems: a commodity money system, and a fiat money system. He establishes (contrary to prior Austrian work on the subject) that under a commodity system, changes in the demand for money *do* have a permanent effect (in the sense of equilibrium or end state) on the structure of production (and in particular on the pure rate of interest [PRI]). In contrast, under a fiat system such changes in demand do *not* have such a lasting effect on the structure of production (and hence the PRI). He goes on to argue that this impact on the structure of production is in fact a beneficial aspect of a commodity money system in contrast to fiat money systems.

Here, after reviewing Hülsmann's argument, we will argue that it is in fact more general and can be applied to contrast the same scenario (changes in monetary demand) under two different *institutional* systems under free banking: 100% reserves vs FRB. We then go on to show that this contrast undermines one of the chief claims made for the asserted economic benefits of fractional reserve free banking (FR/FB), namely that such a system better accommodates changes in the demand for money *without* associated changes in the structure of production, which (it is alleged) would entail unnecessary

*Dan Mahoney (danmahoney44@gmail.com) would like to thank Prof. Guido Hülsmann and an anonymous referee for their helpful comments on earlier drafts of this paper. Any remaining errors are of course the author's responsibility.

CITE THIS ARTICLE AS: Dan Mahoney, "Free Banking and the Structure of Production: A Contrast of Competing Banking Systems," *Libertarian Papers* 3, 14 (2011). ONLINE AT: libertarianpapers.org.

and painful adjustments (due to effects such as price "stickiness", *etc.*) under a 100% reserve system. If changes in the structure of production are a *necessary* (and actually beneficial) result of changes in monetary demand under a 100% reserve system, then it can be said that one of the objectives of FR/FB is to solve a "problem" that does not really exist. We will further note the non-beneficial effects of preventing such a change to the structure of production that must prevail under FR/FB. We thus hope to add a further "quibble" to recent work by Bagus and Howden (2010a) critiquing FR/FB.

Demand for Money and the Structure of Production

In an important article, Hülsmann analyzes a problem that has received comparatively little attention in Austrian circles. Whereas impacts on the structure of production due to changes in the *supply* of money have been well-studied by Austrians (*e.g.*, their business cycle theory), effects due to changes on the demand side have been investigated less so. Mises did not give the issue great attention. Rothbard (2004) in fact looked at the issue in some detail, but came to the same conclusion as Mises: changes in the demand for money do not have a *systematic* effect on the structure of production. The basis for this conclusion (which is now fairly standard in the Austrian literature), is that changes in the demand for money do not *necessarily* entail definite changes one way or another in time preferences, which under the standard Austrian account is the determinant of the length of prevailing production processes. For example, a man may satisfy his demand for greater cash balances by reducing his consumption *and* investment purchases proportionately (time preference being the determinant of the proportion in which he directs his spending on these two categories), thus leaving the relative balance of spending unchanged (and thus the structure of production as well).

However, Hülsmann notes that, under the commodity money system that Rothbard was considering, increases in the demand for money tend to lower the prices of all non-monetary goods across the economy, *including the factors of production used in the extraction of the commodity used as money*. (Hülsmann observes that Rothbard was actually aware of this point and acknowledged it as a possible exception to his argument regarding the time neutrality of the demand for money; however, Rothbard failed to draw out the necessary implications of his own observation.) This effect in turn raises the return on investment (ROI) of gold (say) production, drawing factors of production away from other lines of production and into gold mining, until the ROI is equilibrated at a new, *higher* level. Under such a monetary system, gold production is the *only* line of production whose *physical* outputs can be compared with its *monetary* inputs; no additional sale of the output is

necessary to reckon the profitability of that production. Increased monetary demand means that the purchasing power of *every* gold unit has increased. Hence there is a two-fold effect: the inputs become cheaper for a given physical output, and in turn this output increases in terms of real, economic profitability (due to the increased purchasing power). Again, this is a reflection of a commodity money's unique role in a capital-using economy as both a means of monetary calculation *and* a produced good. This uniqueness of money distinguishes changes in monetary demand from changes in demand for other goods (*e.g.* a change in demand from beer to wine) which results in factors of production being reallocated *within* a given structure of production, and not in changes to the *length* of that structure. The increased ROI for money production can be expected to have an effect on higher order production processes which are most sensitive to the prevailing rate of interest. Following standard Austrian analysis, we would expect increased demand for money to entail a shortening of the structure of production (and conversely, decreased demand for money would entail a lengthening).[1] However, in light of important recent work by Hülsmann (2011), we will see how this claim must be considerably nuanced. We will return to this point shortly.

Hülsmann stresses a further point: money is quintessentially a *present* good. Although it is customary to categorize goods according to whether they are consumer goods, producer goods, or media of exchange (a viewpoint shared by Mises), and in fact there are reasons to consider money to be neither a producer good nor a consumer good, this is a somewhat dissatisfactory state of affairs theoretically. However, Hülsmann notes that this question is irrelevant to what role demand for money plays in the structure of production. Like any other present good, money requires no further transformation to render its desired or intended services. (Hülsmann points out Rothbard's inconsistency in regarding money as the preeminent present good, yet ultimately accepting the conventional [flawed] three-way categorization of goods.) From this consideration, it is very clear that increased demand for money *should* have the same effect on the structure of production as increased time preference. Indeed, psychologically, it can be anticipated that increased demand for money accompanies periods of increased uncertainty, when the desire for liquidity is heightened. Again following standard Austrian analysis, in such situations, the structure of production should become more shortened, more present-oriented.[2] And

[1]This conventional analysis holds that there is an inverse relationship between PRI and length of structure of production.

[2]Interestingly, this implies that the effect of increased demand for money is akin (in regards to impact on the structure of production) to a *decrease* in savings. It is not

again we note that some nuance must be provided for this standard view in light of the work of Hülsmann (2011).

Before discussing these subtleties, it is worth stating the conclusion to this point: changes in the demand for money most definitely *do* have an effect on the structure of production under a commodity system. It is in fact a beneficial role, in addressing the present-orientation of the services provided by money as well as preserving the capital structure from inappropriate diversion into longer-term projects. After having established this important revision to the standard Austrian position, Hülsmann goes on to note that fiat money systems do *not* entail changes to the structure of production (that is, in this case the demand for money *is* time neutral, as conventional accounts hold is the case for money as such). This is because fiat systems typically involve some kind of paper or electronic money, whose acceptance on the market can be compelled by the status of the sovereign as the territorial monopolist of protective and judicial services (to use Hoppe's [2001] brilliant characterization). The production of such entities is virtually costless and dependent only on the will of the sovereign. This is not to say that, *e.g.*, modern central banks face no constraints in their decisions to engage in expansionary monetary policy. They may be constrained (like States themselves) by public opinion, or by simple policy choices of current particular governments or administrators. The point is that "production" of a fiat money does not require associated changes to the structure of production as under a commodity system, and Hülsmann points out the disadvantages to fiat systems in light of this fact.

At this point we have recapped Hülsmann's (2009) argument regarding the impact on the PRI arising from changes in the demand for money under a commodity system. We have also expressed these changes in terms of the conventional Austrian account of the relation between the PRI and length of the structure of production (a paradigmatic exposition is found in Rothbard [2004, Ch. 6-8]). Finally, we have alluded to the need to employ greater care in stating these relations. Although it is not vital to our primary argument here, it is worth pausing for a moment to provide this explanation, not only to illustrate Hülsmann's (2011) potentially radical revision of a central feature of much Austrian work (interesting for its own sake, obviously), but also to demonstrate how it is possible for a change in demand for money to leave various measures of the "price level" unchanged while *simultaneously* effecting a change in an economy's structure of production. This brief digression will thus serve to reinforce our primary point.

uncommon to find claims that not spending is effectively a form of savings, *i.e.* that increased money demand is tantamount to an increase in savings.

The Structure of Production under Changes in Demand for Commodity Money

In this section we very briefly sketch out the precise impact the rising PRI due to increased money demand has on the structure of production. We have been heavily influenced by Hülsmann (2011) in this regard, and strongly encourage all serious students of Austrian capital theory to familiarize themselves with this work.[3]

Standard Austrian capital theory starts with an evenly rotating economy (ERE; see Mises [1998]) with some number of stages of production and a particular PRI. At each stage except the last, entrepreneurs purchase original factors (such as land or labor) and factors of production (capital goods), on which they earn interest when the output is sold at the next stage. (At the final stage capital goods owners only advance present goods to original factors, they do not purchase additional factors of production.) The process is explained in great detail in Rothbard (2004, Ch. 6-8). The conventional Austrian account of the structure of production typically focuses on changes in consumer goods spending and the ramifications on the *length* of the structure of production. In an example provided by Rothbard, a reduction in consumer goods spending (in the conventional account due to increased time preference providing a greater supply of present goods for production purposes) manifests itself in a smaller PRI and a longer structure of production.

In truth, there is more going on in this process than simply a lengthening, as Rothbard's own graphical exposition reveals (*e.g.* Figure 61 in Rothbard [2004]). Indeed, the structure becomes not only longer, but thinner in front and thicker in back. That is, there is decreased spending in processes closer to final consumption, but more spending in stages further from consumption, with an *additional* stage manifested. In general, it turns out that the possible changes to the structure of production are far richer than the conventional Austrian account allows for. The work of Hülsmann (2011) (expanding on themes originally developed in Hülsmann [2008]) lays the foundations for an important contribution to Austrian macroeconomics, and again we cannot hope to do this work justice here. Our limited purpose here is to appeal to this work to outline in what sense the changes of the PRI under changed demand for money affect the structure of production.

Let us assume that demand for money increases, leading to reduced spending across the entire economy. As we have argued above (echoing Hülsmann [2009]) the PRI will increase in such a case. We assume that

[3]Numerical examples motivated by Hülsmann are available by the present author in Excel spreadsheet format upon request.

various aggregate measures of spending fall in the same proportion (say, by 10%). This means that the ERE can only support a structure of production that is *longer* than before.[4] However, we note an important difference to this lengthening from usual Austrian considerations of lengthening. The critical difference is that the *entire* structure becomes *thinner*, not just in front. This is to be expected: as we've noted, increased demand for money typically occurs in times of increased uncertainty, so this lengthier structure is in fact less capital intensive, or in "safety mode" so to speak.[5] We find this example interesting because it attains the monetarist ideal of final (in the ERE sense) price levels of different aggregates falling uniformly in the face of greater monetary demand (it can be shown in this case that the savings rate [suitably defined] stays the same, not surprising as we assume unchanged time preferences), *however* there are very fundamental changes to the economy's production structure in this case. (More on this supposed ideal will follow below.) This serves as another cautionary tale of the possibility of being misled by preoccupation with aggregates (at least if insufficient care is employed when considering them).

Having illustrated the precise sense in which the increased PRI that arises from increased demand for money renders the structure of production more present-oriented, we now turn attention to increasing the scope of Hülsmann's (2009) original argument.

Demand for Money under 100% Reserves and FR/FB

We now turn attention to the extension of Hülsmann's argument above to the institutional case of two different banking systems, one practicing 100% reserves, the other practicing FRB.

The first thing to note here is that Hülsmann's argument requires no modification for the 100% reserve case. The reason, of course, is if Menger's

[4]Intuitively, we can understand this state of affairs as arising from the fact that, although spending decreases across *all* stages of production [we adopt the usual perspective that increased demand for money can entail decreased spending on consumer *and* production goods, with no particular bias], the PRI increases, hence there must appear an additional stage of production, further from final consumption, to enable this higher rate of return. Mathematically, an additional stage of production is necessary so that the increased PRI permits total spending to match the assumed level (say, 90% of the level at the previous ERE), using the relations that must prevail between capital good and original factor spending between stages.

[5]Amusingly, we find a neoclassicist interpretation of activity farther out from final consumption under such conditions: these longer-dated production processes are riskier, hence they *must* reap a higher return (standard risk-return portfolio considerations). There is indeed less activity in back now, but that which is there must be suitably compensated.

account of the origin of money as a previously valued commodity in its own right (bolstered by Mises' [1998] famous regression theorem) is accepted, then 100% reserve systems are inherently commodity money systems. These systems employ money substitutes, but these substitutes are always and everywhere fully backed by the commodity money. Supply of such substitutes can only be expanded if the commodity money base expands, so money substitutes are as integrated into the structure of production as the commodity money itself. Indeed, the substitutes are *equivalent* to the commodity money in this regard. The economic benefits offered by money substitutes in this case (*e.g.* convenience) do not impact the consideration of money's effects on the structure of production. Hülsmann's argument is unchanged, except again to note that the conventional Rothbardian account/advocacy of 100% reserve banking must be modified to acknowledge the time non-neutrality of money demand in regards to the structure of production.

We claim that Hülsmann's argument regarding the time neutrality of demand for fiat money also applies to the case of fiduciary media under FR/FB. (Fiduciary media of course are money substitutes *not* fully backed by a base or commodity money.) The reason is the same: the expansion of fiduciary media is essentially costless and depends only on the will of the bankers (see also Hülsmann's [2000] review of White). Again, as in the fiat money case, this does not imply that free banks face no constraints on their actions. The fear of redemption (bank runs) can act to restrain monetary expansion. But this is irrelevant to the point that production of fiduciary media requires that *no* factors of production be bid away from alternative uses in the economy.[6,7] As such, expansion of fiduciary media will entail no changes to the structure of production.

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[6]Horwitz (2010) has attempted to argue that expanding the money supply is not costless to free bankers, because they face a liquidity risk, namely the risk of bank runs (redemption failure) if they misperceive demand for money. However, it seems quite a stretch, if not an abuse of terminology, to characterize such risk (which no opponent of FRB has ever denied serves as a check on the activities of such banks) as a "cost." This makes as much sense as saying shoe producers face the cost that demand for shoes will be less than they anticipate. Needless to say, Horwitz's point has no bearing on the relation of issuance of fiduciary media to the structure of production.

[7]In response to Bagus and Howden (2010a), Selgin (2011a) rejects the applicability (to free banking) of the standard refutation of the Real Bills Doctrine, namely that free banks can influence demand for their product by the ability of the bankers to unilaterally lower the rate of interest they charge on loans (see also Huerta de Soto [2006]). Selgin essentially asserts that under free banking, the banks can only expand if they perceive the demand for bank liabilities to be rising (*e.g.* by decreased calls for redemption). Whether or not Selgin is correct here (and he is assuming an equilibrium situation where fiduciary media exist as an economic good, precisely the point under dispute), the point remains

In some sense, however, it is not critical for our purposes how general Hülsmann's argument really is, because the free bankers themselves portray their system as beneficial *precisely because* it avoids changes to the structure of production that they deem to be "painful" or "unnecessary". We now provide some textual support for this claim.

FR/FB and the Facilitation of Demand for Money

It is probably not very controversial to state that the defenders of FR/FB, operating within the Yeagerite monetary equilibrium (ME) framework, view as a considerable strength of their system the fact that changes in the demand for money can be more readily accommodated than under a 100% reserve system. It is said that, in the absence of a mechanism such as FRB and entities such as fiduciary media, an increase in the demand for money will entail price adjustments across the entire economy, and due to various "rigidities" (such as price "stickiness"), great difficulties can arise which take time to ameliorate. The issue is further compounded by the fact that entrepreneurial activity is supposedly limited in its ability to facilitate such adjustments (*e.g.* due to the fact the businessmen allegedly only see their own selling prices change and not their costs). The essence of the ME position is that changes in the purchasing power of money that arise on the monetary side of the economy are problematic, and that such changes should be arrested by the appropriate policy and/or institutions.[8] See Bagus and Howden (2010a, b) for an excellent critique of some of these assumptions.

The issue that interests us here is not the dubiousness of some of the standard ME assumptions. Rather, we are concerned with an implicit assumption underlying this body of thought as regards money demand and the structure of production. Specifically, there is a belief that the "ultimate" (in an equilibrium or final state of rest sense) result of a change in demand for money will only affect price levels or the volume of cash holdings and leave the structure of production unchanged. In this way, the following two systems can be contrasted:

1. A supposedly inflexible 100% reserve system (complete with entrepreneurs who are unable to anticipate such changes) which must endure slow, painful adjustments as the structure of production

that the issuance of fiduciary media is not constrained in any way by the need to bid factors of production away from other entrepreneurs in the economy.

[8]Note that the opposition is not to changes in the purchasing power of money as such, *e.g.* price declines as arise from a growing economy. The free bankers generally do avow support for what they deem "benign" deflation.

changes but finally restores itself to its original state, only with lower prices across the board.

2. A flexible fractional reserve system (staffed by bankers who are able to properly direct fiduciary media to the right parties) that can quickly satiate monetary demand at the current price level while leaving the structure of production untouched.

Thus, under both systems it is believed that changes in the demand for money will not manifest itself in permanent changes in the structure of production. Note the hidden premise here: that it is economically irrelevant whether a given stock of money has its purchasing power increased, or whether cash holdings at a given price level increase. Since their system achieves the latter (allegedly equivalent to the former) more quickly and less painfully, it is to be preferred. In support of this claim, we offer the following textual evidence:

For example, we have in Selgin and White (1996):

> In discussing the requirements for preserving "monetary equilibrium" (that is, equality between the nominal quantities supplied and demanded of money balances, or equivalently between the real stock and real quantity demanded) it is important to distinguish between short-run and long-run implications of changes in the demand schedule for money or in the stock of money. In the long run, nominal prices will adjust to equate supply and demand for money balances, whatever the nominal quantity of money. It does not follow, however, that each and every change in the supply of or demand for money will lead at once to a new long-run equilibrium, because the required price adjustments take time. They take time because not all agents are instantly and perfectly aware of changes in the money stock or money demand, and because some prices are costly to adjust and therefore "sticky." It follows that, in the short run (empirically, think "for a number of months"), less than fully anticipated changes to the supply of or demand for money can give rise to monetary disequilibrium. The quantity of money supplied may exceed the quantity demanded, in which case prices need generally to rise; or the quantity of money demand may exceed the quantity supplied, in which case prices need to fall (Yeager 1986).
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> Such states of monetary disequilibrium, although temporary, may involve serious misallocations of resources. In addition to involving prices that are generally "too low" or "too high" (for equilibrium in money holding), they also typically involve distortions of relative prices, most importantly (we learn from the Austrian business cycle theory) the rate of interest. Following Wicksell, the Austrian theory holds that an unanticipated injection of money (or rise in the "velocity" of money) can drive the interest rate in the short run

> below its equilibrium ("natural") level, and thereby encourage unwarranted investments. Correspondingly, an unanticipated destruction of money (or drop in "velocity") can drive the interest rate in the short run above its natural level, and thereby artificially curtail warranted investments.

Note in the above passage the stressing of distinctions between "long run" effects involving prices adjustments only, and "short run" effects involving *temporary* (mis)allocations of factors of production. A similar theme is echoed in Horwitz (1997):

> There are two important points about this process. The first is that it is a process. Claims about the supposed neutrality of money frequently rely on comparative statics which look only at the starting equilibrium and the new equilibrium at the higher price level. In such a comparison, it is not obvious why the increase in the money supply matters. In the long run, any nominal money supply is compatible with monetary equilibrium, given a flexible price level. However, the issue is not the long run, but the adjustment process between equilibria. The damage of excesses or deficiencies in the money supply is done during the process by which the price level moves upward or downward. Assuming a flexible price level (and flexible individual prices) assumes away all that is of interest.
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> This brings in the second point—one crucial to seeing how Hutt's work relates to this monetary equilibrium tradition. The problem which occurs during the disequilibrium adjustment process is that changes in the price level must take place through changes in the prices of all of the goods which trade against money. That is, the "price level" is simply a composite of the myriad individual prices of goods and services. For the price level to change, all of those individual prices must change, and there is no reason to believe that each and every price will rise or fall in exact proportion to the excess or deficiency in the money supply. The particular path by which money is added or removed from the market and the unpredictable and differential wealth effects of additional money balances on the spending patterns of individual actors give us no reason to think that prices will all rise equiproportionately. The result is a distortion in the constellation of relative prices, what Mises (1966, p. 413) called a "price revolution." This price revolution implies significant resource misallocation, as prices are less tightly linked with consumer preferences and producers' assessments of costs and scarcities. The undesirable macroeconomic effects associated with both inflation and deflation are largely results of the way in which each one undermines the microeconomic pricing process. Idleness and misallocation of resources occur because market actors are unable, or less able, to rely on the price system to guide them in their attempts to discover what to produce and how best to produce it.

Note the ideal invoked here: that price changes required by changes in the demand for money should change equiproportionately; in other words, that *relative* prices are unchanged. In actual point of fact, since relative prices *do* change in the short run (for various reasons), the ideal is unattained (or attained quite imperfectly) absent an institution like FRB. Selgin (1997) states these beliefs clearly:

> As a result [of the hesitations of sellers to adjust their prices in the face of a monetary disequilibrium], the economy must grope its way slowly toward a new price-level equilibrium. In the meantime, both the price level and *relative* prices continue to be displaced from their ideal, full-equilibrium values—the values they must attain if they are to be accurate guides to entrepreneurial activity.
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> Episodes of monetary disequilibrium, and long-lasting episodes especially, cannot fail to have serious repercussions. According to the elementary logic of the so-called equation of exchange, any change in either the supply of or demand for money , to the extent that the change is not immediately and fully reflected in an (equilibrating) change in the price level, will imply changed values of real output and employment. To quote economist John Gurley, "Money is a veil, but when the veil flutters, real output sputters." Moreover, because monetary disequilibrium also involves a distortion of relative prices, its real effects are not limited to mere alterations in *total* quantities of output and employment but also involve qualitative changes in the composition of each, to the detriment of all-around well-being.
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> All of this suggests that well-designed monetary arrangements and policies are important to the success of any free-market economic system.[9]

It would be easy to find similar passages in the works of the prominent Austrian ME theorists, but these should suffice to demonstrate the main point: for the ME theorists, equilibrium after a change in demand for money is characterized by an unchanged structure of production. It should be clear how this viewpoint conflicts greatly with Hülsmann's argument above, but we will elaborate a bit.[10]

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[9]All emphases in original. In passing we note the sympathy here for the notion of "velocity" of money (as entailed in the equation of exchange) that appears throughout the ME literature, a sympathy that is not widely shared in Austrian circles (*e.g.* see Bagus [2009] or Hazlitt [1968]).

[10]The Austrian free bankers often emphasize the non-neutrality of money (see the passage by Horwitz above). However, in a sense they actually embrace a "weak-form" version of money non-neutrality, as they allow for the fact that short-term or transitory effects can be transmitted via demand for money into the larger economy, but that

The ME Case Against 100% Reserve Banking: An Inapt Comparison

We can draw an immediate conclusion now: in their contrasting of the processes leading to equilibrium occurring under competing banking systems (100% reserves and FRB), the Austrian ME theorists are making an invalid comparison. Under a 100% reserve system, the changes induced in the structure of production are *not* a regrettable (however temporary) side effect of the adjustment process, but rather an *inherent* part of the process of adjusting the structure of production to reflect the new reality of changed demand for a real good (namely, money). The fact of this change (in demand) means more than just adjustments to the price level; it means an actual change in relative prices. It is precisely such changes that the ME theorists wish to avoid. However, it is then irrelevant how flexible or painless the mechanisms under free banking are in this regard. The system seeks a different goal than that under a 100% reserve system. We have noted not only how the structure of production should (and must) change under a change in money demand under 100% reserves, but also stressed how these changes are in fact beneficial. In particular, increased demand for money generally signifies an increased present orientedness on the part of economic actors, precisely the situation under which the economy's production structure should become longer but thinner. As under fiat systems, it is just this effect that the free bankers' policies counteract.

The point we wish to stress here is that the equilibrium states that prevail under the two different institutional arrangements (ignoring for the moment possibilities that FR/FB is in fact *not* equilibrating but rather destabilizing; see the short discussion below as to the connection with business cycle theory) are quite different. Whatever the merit of the proposed

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longer-term or permanent effects of demand for money are manifested only through price levels. It should be obvious how this viewpoint conflicts with the position taken here. An emblematic statement of the "weak form" version is given by Selgin (2011b):

> It is important to understand the difference between a price level that is "fully flexible" in the sense meaning that there are no barriers to agents' freedom to buy or sell for prices that they deem appropriate, and one that is "fully flexible" in the sense meaning that it never fails to adjust to its G.E. value. Only the latter sort of flexibility—a flexibility which, despite contrary assertions by New Classical economists and some Austrians, is unlikely to be achieved in real markets—makes any pattern of money supply behavior as good as any other. The other, realistic sort of flexibility is such that certain patterns of money supply behavior are in fact likely to be better at keeping real variables at their "natural" or G.E. values than others.

In other words, money prices are really just proxies for underlying, "fundamental" value relations, and the concern is with policies and institutions that ameliorate short-term complications as actually-existing prices deviate from these underlying relations.

policies under FR/FB (and the soundness of the arguments offered in their defense), it is simply not true that it accomplishes the same thing as a 100% reserve system only better, which is the essential theme of the Austrian ME school. Rather, different equilibrium outcomes occur under the two arrangements. If the institution of FRB is to be defended, it must be on the basis of the superiority of the end state that it generates (*e.g.*, that it is bad for the structure of production to become permanently altered when demand for money increases; or, that monetary calculations should not be influenced by the production of money).

Note also that when the free bankers speak of expanding the money supply, they in fact are referring to an increase in *stock* (the flow vs. stock distinction raised in Bagus and Howden [2010a]; see also the discussion of reservation demand in Rothbard [2004, esp. Ch. 11]). But in a capital-using economy, changes to stock via production are carried out by monetary calculations, which in turn depend on the purchasing power of money (both as it currently stands and in anticipation of its future level). We have already discussed Hülsmann's outline of this mechanism in regards to producing money in a 100% reserve system. We only further note here that it is precisely such changes in purchasing power that the free bankers seek to halt. In this sense, they view the production of money as taking place outside the nexus of economic calculation.

We finally note here that, in contrast to the situation under 100% reserves, in the face of increased demand for money, FR/FB seeks to keep the structure of production *shorter and thicker* than it otherwise would be (as we have argued, such increased demand should entail a lengthening and thinning of that structure). Indeed, when Selgin (2011a) speaks of demand for bank liabilities as representing a loan to the issuing bank, it suggests that free bankers envision a change to the structure of production akin to what happens when time preferences fall. Whether or not this is the intent, it seems clear that their preferred policy is at odds with the changes that *should* take place to the structure of production in this case. As such, an exactly analogous situation arises as under the case considered in traditional Austrian Business Cycle Theory (ABCT). On the basis of this theory, we can anticipate that FR/FB will indeed be beset by cycles and crises, as claimed by Bagus and Howden (2010a)[11].

[11]We should note here Hülsmann's (1998) important revision of conventional ABCT, which indeed has some defects. Since we avoid here the issue of whether FRB is fraud (and thus whether its persistence requires the presence of some kind of institution that perpetuates illusion as to its true nature), it is in fact not clear whether cycles such as we observe under existing, central bank-dominated monetary systems will exist under the

Conclusions

In this article we have provided another bit of ammunition to the case against FR/FB made in Bagus and Howden (2010a). We extend an argument of Hülsmann (2009) to characterize the changes in the structure of production induced by changes in the demand of money under different institutional banking systems. Specifically we note that the Austrian ME theorists do not take into account that under a 100% reserve (commodity) system, changes in the demand for money *must* entail a change to the structure of production. Therefore their familiar argument contrasting the ability of one system to attain an equilibrium leaving relative prices unchanged is erroneous, as it equates inherently different equilibrium states under the two systems as a means of characterizing one system (FR/FB) as superior in attaining that (alleged) common equilibrium.

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