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Hayek's Monetary Theory and Policy: A Critical Reconstruction

Hayek's critique of price-level stabilization was based on the claim that only a constant money stock, (M), or constant volume of nominal spending, (MV), allows intertemporal price equilibrium. The claim is not generally correct. Hayek's case (in principle) for constant MV and his critique of the automatic gold standard for not delivering it are thus uncompelling. The injection effects of his business cycle theory provided an alternative basis for his prescription. In the 1970s Hayek switched to endorsing price-level stabilization. In doing so he was logically compelled to repudiate his business cycle theory.

FRIEDRICH A. HAYEK (1899–1992) was among the profession's leading monetary theorists on the eve of the Keynesian revolution. The goal of his early work on money, capital, and business cycles was, in Hayek's (1933 [1929], p. 33) own words, "the incorporation of cyclical phenomena into the system of economic equilibrium theory, with which they are in apparent contradiction." Robert Lucas (1981, pp. 215–19) has commented that "it is likely that many modern economists would have no difficulty accepting Hayek's statement of the problem as roughly equivalent to their own."

While Hayek's work generally and his business cycle theory in particular have received a fair amount of critical attention in recent years, his underlying monetary and banking theories have not.[1] Here I reconstruct and criticize Hayek's analysis of the requirements for intertemporal price equilibrium in a monetary economy, and the prescriptions for monetary policy built upon it. I find that a key conclusion Hayek drew—that a constant volume of nominal spending is required for monetary equilibrium over time—does not follow under Hayek's own perfect-foresight assumptions. His critique of the gold standard for failing to deliver a constant volume of nominal spending

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1. Treatments of Hayek's business cycle theory include O'Driscoll (1977), Garrison (1986), Steele (1992), Cottrell (1994), and the ten essays collected in Colonna and Hagemann (1994). Butos (1985), Scheide (1986), van Zijp (1990), Rühl (in Colonna and Hagemann 1994, ch. 9), and Arena (in Colonna and Hagemann 1994, ch. 10) compare and contrast Hayek's and Lucas's equilibrium concepts and approaches to cycle theory. Most of these discussions understandably focus on the model Hayek presented in *Prices and Production* and subsequently. Only David Laidler (in Colonna and Hagemann 1994, ch. 1) discusses at any length the subject that most concerns me here, the foundational role of Hayek's 1928 paper on intertemporal price equilibrium in Hayek's monetary theory and policy views. On Hayek's work in economics generally, see Machlup (1974), McCormick (1992), and Hayek (1994).

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was thus not well grounded. An alternative and perhaps more promising basis for opposing price-level stabilization policy was Hayek's business cycle theory, in which monetary injections distort intertemporal allocation in a setting of imperfect foresight.

Hayek's constant-*MV* norm helps to explain his otherwise puzzling ambivalence toward free banking and the gold standard. His mentor Ludwig von Mises (1980 [1912], 1978 [1928]) had strongly supported them, and Hayek (1991 [1933], p. 26) himself elsewhere viewed free competition and evolved market institutions as irreplaceable means for social coordination. But in a later statement of the vision that guided his early theorizing, Hayek (1960, p. 325) declared that "all money at all times," without regard to the regime supplying it, is "a kind of loose joint in the otherwise self-steering mechanism of the market."[2]

INTERTEMPORAL EQUILIBRIUM AND THE CRITIQUE OF PRICE-LEVEL STABILIZATION

Hayek's early work, up to and including *Prices and Production* (1931), aimed at providing a theoretically well-grounded critique of the dominant monetary policy prescription of the day. Price-level "stabilizers" called for the central bank to expand the stock of money in step with real output, rather than letting prices fall as they would in a growing economy with a constant money stock or an automatic gold standard.[3] In his new preface to the English translation of *Monetary Theory and the Trade Cycle,* Hayek (1933, pp. 16–17) noted that "the critique of the programme of the 'stabilizers,' which is in many ways the central theme of this book, has now occupied me for many years."[4] Hayek's analysis of intertemporal price equilibrium provided the theoretical underpinning of his critique.

The error of the price-level stabilization program was not just an abstract theoretical issue. Hayek believed that the program was inspiring the Bank of England and the U.S. Federal Reserve System between 1925 and 1929 in a harmful and ultimately futile joint effort at monetary expansion to prevent the fall in prices that should have accompanied the outflow of gold from Britain and the rapid growth of real output in the U.S. economy. Hayek (1984 [1932], pp. 125, 130) subsequently considered the deep crisis of 1929–32 to have been the inevitable reaction.[5]

2. Garrison (1984) extends this metaphor: in some versions of New Classical macroeconomics, money is a "tight joint"; while in some versions of Keynesian economics money is a "broken joint."

3. A gold standard produces secular deflation in a growing economy if the long-run stock supply curve for gold is not perfectly flat, and if the demand curve shifts rightward over time faster than the supply curve, which can occur because of depletion effects in mining (Bordo and Ellson 1985, Chappell and Dowd 1997). Rolnick and Weber (1994, p. 7) find that metallic standards historically exhibited mild secular deflation: inflation averaged approximately −0.5 percent per year.

4. Hayek here cited a series of six articles he had published between 1925 and 1932, and *Prices and Production.* When Hayek (1935 [1931], p. 107; 1984, pp. 17, 119–20; 1939 [1929], pp. 253–4) referred to the "stabilizers" by name, he cited principally Irving Fisher and Gustav Cassel, but also J. M. Keynes (of the 1923 *Tract on Monetary Reform*), R. G. Hawtrey (although Hayek elsewhere praised Hawtrey's contributions to business cycle theory), and William Trufant Foster and Waddill Catchings. Selgin (1996) places Hayek among a group of economists (including D. H. Robertson, Gunnar Myrdal, and, contrary to Hayek's reading of him, Hawtrey) who subscribed to the "productivity norm"—the view that the price level should fall with increases in productivity—as against the norm of price-level stabilization.

5. After 1929 Hayek (1984 [1932], p. 130) complained that Federal Reserve attempts to re-expand credit, "in complete accordance with the prescriptions of the stabilization theorists," in combination with inter-

Hayek's theoretical critique argued that changing the quantity of money to stabilize the price level necessarily disrupts achievement of the *relative* price relationships needed for intertemporal equilibrium in a production economy.[6] To argue that stabilization policy discoordinated the British and U.S. economies in the 1920s, it was only necessary for Hayek to show that it conflicted with the central banks' simultaneous commitment to the gold standard. But in a key 1928 article Hayek (1984 [1928], p. 97) advanced the more sweeping and less defensible thesis that *any* change in the quantity of money is discoordinating under *any* monetary regime:

> It would be possible to conceive of a structure of money prices at successive points in time being established which corresponds to the intertemporal equilibrium system, only if the monetary system was one in which any change in the quantity of money was excluded.

Hayek was not successful in establishing this claim because in such a sweeping form the claim is incorrect. Outside a commodity standard with a fixed parity, a change in *nominal* money and prices does not entail a change in *real* variables away from values consistent with intertemporal equilibrium.

Hayek (1928) aimed to establish that when expected overall productivity (or the expected real cost of production) differs between two dates, the expected price levels need to differ to allow an equilibrium allocation of output between the two dates. He built the argument by analogy to three cases where relative price differences clearly *are* necessary for equilibrium. First, if two locations differ in comparative advantage, so that one location can produce eggs (Hayek's example) more cheaply, the price of eggs must differ between the two locations in equilibrium, assuming positive transportation costs. Second, if eggs are more cheaply produced during summer than during winter, equilibrium likewise requires a seasonal difference in egg prices, assuming positive storage costs. Third, if relatively rapid technical advance is correctly anticipated in the egg industry, so that eggs will be more cheaply produced in the future, equilibrium over time requires an anticipated decline in the relative price of eggs. Preventing the equilibrium price gradation in any of these cases would, as Hayek argued, cause a mismatch between supply and demand.

Hayek then moved the analysis to the aggregate level. Consider an economy with only two explicit goods, a composite consumption good and money, at two dates. Hayek (1984 [1928], pp. 92–93) argued that for intertemporal equilibrium in production, as in the second and third cases above, the (anticipated and realized) money price of the consumption good (which here amounts to the "price level") must be lower for the date at which output in the consumption-good industry is higher. If productivity is

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ventionist measures undertaken by Hoover, were deepening and prolonging the crisis by "preventing or delaying the normal process of liquidation." Had contemporary data been available to him, Hayek—to be consistent with his own constant-MV norm—might have placed greater emphasis on the danger of allowing MV to continue shrinking. By 1933 United States nominal GNP had fallen well below even its lowest point of the 1920s (Greenfield 1994, p. 10).

6. On Hayek's 1928 article as a pioneering work in intertemporal general equilibrium analysis see Milgate (1979, pp. 4–6), Boehm (1986), and Ingrao and Israel (1990, pp. 230–35). Here Hayek laid the groundwork for his well-known later methodological discussion of general equilibrium analysis (Hayek 1948, pp. 33–56).

increasing over time, "the expectation that prices will not change calls forth an excessive rise in output for the future" relative to the provision for the present.[7]

THE FLAW IN HAYEK'S INTERTEMPORAL PRICE EQUILIBRIUM ARGUMENT

Hayek's argument here is perfectly correct under a fixed gold standard. A falling marginal cost of producing the consumption good, *relative* to gold, implies a rising equilibrium relative price of gold, and thus a falling price level measured in dollars of fixed gold content. A fixed gold standard automatically produces just this result, though Hayek thought otherwise (see below).

But the argument fails to go through for all conceivable monetary regimes. Hayek had failed to distinguish between real and purely nominal changes in the value of the monetary unit. Under an "adjustable" gold standard, the quantity of dollars and value of the dollar can in principle be altered *without* disturbing real variables, by altering the gold content of the dollar (for example, devaluing) and appropriately rescaling all nominal prices and debt contracts. Such a devaluation would be like a mere switch in measurement units from ounces to grams. In a fiat money regime, the quantity and value of money are likewise purely nominal variables in a comparative-statics thought experiment. Proportional change in every agent's fiat money balances and all money prices (including debts) constitutes merely a neutral change in the economy's nominal scalar.[8]

An equilibrium in *intertemporal* exchange and production is possible in a two-period economy with such a parametric change in second-period money stock and prices, contrary to Hayek's sweeping claim that any change in the money stock must be excluded, provided that agents making contracts and plans spanning the two dates correctly anticipate and "see through" the change. For unindexed loan contracts, this means adding an inflation premium to the nominal interest rate just sufficient to leave the real interest rate at its equilibrium value. For intertemporal production plans, it means calculating profits in terms of real (appropriately deflated) rather than merely nominal input and output prices.

In a world of *fiat* money—a base money with zero demand for nonmonetary uses and a zero marginal cost of producing nominal units—the notions of the equilibrium *comparative* cost and *relative* price of the consumption good (vis-à-vis the money good) no longer apply. As Gilbert (1957) has argued, under the assumption that the price level at every future date is correctly anticipated, there is in fact no single path for the price level uniquely consistent with intertemporal equilibrium in a fiat money regime. Correct inflation premia can in principle be incorporated into intertemporal money-denominated contracts and production decisions. The nominal interest rate can be adjusted as necessary to allow the correct money terms of trade between any pair of dates at which fiat money is anticipated to have different purchasing powers. Hayek's argument, that a stable nominal price level necessarily discoordinates pro-

7. An appendix available from the author restates and criticizes Hayek's intertemporal price equilibrium argument in more technical detail.

8. For a standard statement of this proposition see Patinkin (1965, pp. 74–75).

duction decisions in a world of growing productivity, implies that producers compare *undiscounted nominal* selling prices when deciding for which date to produce. That decision rule is appropriate only if the intertemporal money exchange rate is somehow fixed at 1:1, that is, the nominal interest rate is fixed at zero. Although Hayek (1984 [1928], p. 117, n. 29) cited Irving Fisher, he failed to reconcile his argument with Fisher's distinction between nominal and real interest rates.

Under fiat money there is no inherent inconsistency in assuming both (1) a positive real interest rate and (2) growth in the money stock just sufficient to produce a stable price level.[9] The nominal interest rate is thus not fixed at zero.[10] But are the two assumptions jointly consistent with the behavior of profit-maximizing gold mine owners under a gold standard? Facing a positive interest rate, why would any mine owner hold non-appreciating gold *in situ* rather than extract all known reserves now and invest the proceeds? As Rockoff (1984, pp. 619–20) notes, under the right conditions "Hotelling's rule" applies: in a perfect-foresight competitive equilibrium, with flat and nonshifting extraction costs, the value of a unit of unextracted gold must rise over time at the real rate of interest its owner could otherwise be earning. Given a positive real interest rate, the price level measured in gold must fall at the real rate of interest, vindicating the assumption of a zero nominal interest rate. The conditions for Hotelling's rule need not hold, however, and historically did not hold. Extraction costs rose at the margin and fell over time, so that it paid to delay some extraction despite the low appreciation rate of gold, and unanticipated gold discoveries occurred. Nominal interest rates remained positive under historical gold standards.

That more than one price level path permits an intertemporal equilibrium in a fiat money regime, because the nominal interest rate can be adjusted accordingly, does *not* imply that real variables are identical in all equilibria (that fiat money is "superneutral"), nor that there are no relevant grounds for preferring one price-level path (or rate of inflation) to another under a fiat regime. The principal relevant grounds are presumably: (1) how readily a path can in fact be correctly anticipated, (2) injection effects associated with the monetary policy for maintaining that path, and (3) the "noisiness" of nominal prices, (4) the costs of adjusting prices and/or experiencing nominal rigidities, and (5) the cost of holding money, along that path. The first two were issues Hayek did emphasize in his business cycle theory.

MONETARY POLICY NORMS

From his too-sweeping claim that "changes in the total quantity of money can never contribute to the maintenance of equilibrium but on the contrary must always

9. If the nominal interest rate paid on money-denominated bonds is significantly positive, while the rate on money is zero, this does beg the question posed in a classic article by Hicks (1967 [1935], p. 66): why in equilibrium does anyone hold money (store it from the first to the second period) rather than bonds? On this see White (1987).

10. Hayek (1984 [1928], p. 83) noted that "the medium of exchange generally permits the individual to store it for the future in a way which is costless (or even yields a positive return)." However, the costless storage of money only establishes a zero *floor* to the nominal interest rate. It is not a binding constraint on the nominal exchange rate unless the price level is expected to fall faster than the real rate of interest.

disrupt it," Hayek (1984 [1928], pp. 109, 97) logically enough concluded that in principle a frozen quantity of money was least discoordinating. Despite his well-known arguments elsewhere for respecting the embodied wisdom of spontaneously evolved market institutions, Hayek (1984 [1928], pp. 96–97) criticized the gold standard because it allows the quantity of monetary gold to vary. He likewise (Hayek 1933 [1929], pp. 177–80; 1935 [1931], pp. 115–17) criticized free banking because it allows the quantity of bank-issued money to vary (see White 1997).

Hayek's criticism of the gold standard does not in fact follow from his concern for intertemporal equilibrium. It is true that the path of money prices established with an upward-sloping or shifting gold stock supply curve is different from the path that would prevail if the stock of gold were permanently fixed, but it does not follow that intertemporal equilibrium is necessarily disturbed. The correct inflation premiums can be incorporated into intertemporal money contracts provided that short-run and long-run movements in the purchasing power of gold are correctly anticipated by contracting parties. With correct anticipations by gold producers, the gold stock and the relative price between gold and consumption goods will move just as required for intertemporal equilibrium. Holding the quantity of monetary gold constant, by contrast, is normally inconsistent with equilibrium in gold production.

The untenability of Hayek's 1928 intertemporal-equilibrium case for fixing M does not show that there is no good case, much less that there is none for stabilizing MV (see below). It only shows that the case would have to be built on a different basis.[11] An appropriate basis would be an argument showing that money injections disturb actual or perceived *current relative* prices (rather than merely the relationship between current and future *nominal* prices). Though Hayek's 1928 argument against price-level stabilization did *not* rest on injection effects or the public's imperfect foresight of prices, these were crucial to the business cycle theory he spelled out in the 1930s. (Their importance is perhaps clearest in Hayek 1939 [1933]). In Hayek's (1931) cycle theory, an unanticipated money injection temporarily reduces market interest rates below long-run equilibrium—or the banking system expands credit rather than raise loan rates when loan demand and the equilibrium rate rise—distorting the price of capital goods relative to consumer goods. Alternatively, in Lucas's (1981) theory, an unanticipated injection that changes the price level leads agents to infer mistakenly that relative prices and real wages may have changed.

In his 1928 essay, and in a 1929 critique of the Foster-Catchings scheme for price-level stabilization, Hayek (1939 [1929], pp. 262–63) had proposed that the money stock should be held constant, and the price level allowed to fall, in the event of increases in output (due, for example, to technological improvements or net capital formation). In these early writings Hayek did not explicitly consider other justifications, besides changes in the volume of output, for changing the total quantity of money. But his sweeping claim (1984 [1928], p. 109) that "changes in the total quantity of money can never contribute to the maintenance of equilibrium but on the contrary must always disrupt it" effectively ruled out all other justifications.

11. For an exchange between current proponents of price-level stabilization and the "productivity norm" see Dowd (1995) and Selgin (1995).

In *Prices and Production* (both the 1931 first edition and especially the 1935 second edition), Hayek (1935, pp. xii, 123–24) acknowledged that there was an important exception to his "original maxim of policy, that the quantity of money should remain invariable." He had previously "excluded considerations of changes in the velocity of circulation," but a change in transactions velocity "has rightly always been considered as equivalent to a change in the amount of money in circulation."[12] Consequently "any change in the velocity of circulation would have to be compensated by a reciprocal change in the amount of money in circulation if money is to remain neutral toward prices."

Hayek evidently reasoned (see Hayek 1960, pp. 325–26) that a change in velocity, just like a change in the money stock, would disturb intertemporal equilibrium by causing movements in the price level to diverge from movements in the costs of production.[13] Hayek (1935, p. 131) accordingly expressed his revised monetary policy norm not as constancy of the money stock (M), but as constancy of "the total money stream," the money stock times its velocity of circulation (MV).

After switching from the constant-M to the constant-MV norm, Hayek altered his critique of the gold standard accordingly. Emphasizing changes in velocity V (to which the supply of money M *ought* to respond promptly to stabilize MV), rather than changes in goods output (to which M still *ought not* to respond), Hayek (1948, pp. 210–11) now declared gold's supply elasticity to be a virtue rather than a vice. The principal flaw of the gold standard was now the inadequate speed with which the gold stock responded to money demand shifts. Hayek noted critically that, in response to a rise in the value of gold, the quantity of gold would change much less in the short run than in the long run. But gradual adjustment of the quantity of gold is in fact entirely appropriate when it is less costly than making the entire adjustment instantly.

Hayek (1937) emphasized that the constant-MV norm pertained to a unified monetary economy as a whole, not to any regional subset like a single nation within an international gold standard. Elasticity of any regional money stock was desirable because maintenance of an interregional equilibrium, given changes in the relative money demands of various regions (due, for instance, to shifts in their shares of world income), required changes in the interregional distribution of money balances. Purely national monetary policies, particularly price-level-stabilization policies, would clash with the global redistributions of money required for interregional equilibrium.

WORLD MONETARY AUTHORITY OR GOLD STANDARD?

Hayek (1937, p. 93) noted that implementing the constant-MV norm in a multinational currency area would require "a central monetary authority for the whole world," or its equivalent in policy cooperation among national central banks, acting to

12. Hayek did not explicitly distinguish here between income velocity and transactions velocity, but he clearly meant the latter.

13. A change in velocity does *not* seem "equivalent to a change in the amount of money in circulation" with respect to the latter's likely injection effects. A rise in V is unlikely to have the same spillover effect on the loanable funds market as an injection of M via open market operations and consequent bank expansion.

offset changes in M (arising from changes in the money multiplier) and in V.[14] He emphasized that the norm did *not* provide "a practical maxim of currency policy" for a *national* central bank constrained by the international gold standard, beyond counseling it to exercise greater restraint in monetary expansion both during the boom and during the depression. But Hayek (1935 [1931], p. 127) was far from optimistic about the prospects for improving monetary policy by actually creating a world monetary authority. The gold standard did tend to return the price level to a steady long-run path, which made nominal prices more predictable than they would likely be under a replacement regime in practice. He warned that an attempt "drastically to reconstruct our monetary system, in particular to replace the semi-automatic gold standard by a more or less arbitrarily managed currency" posed dangers "much greater than the harm which is possibly done by the gold standard."[15] This warning was no doubt validated, in Hayek's eyes, by experience under the Bretton Woods system.

Because he rejected price-level stabilization as an ideal, Hayek (1935, pp. 127–28; 1984 [1932], pp. 118–19) dissented from the common view that the difficulties of the Great Depression were to be blamed on deflationary tendencies of the gold standard. The discoordination of the world economy was, on the contrary, the result of the policies of central banks that—inspired by the price-level stabilization idea—had rejected the discipline and had subverted the functioning of the gold standard. Though Hayek (1937, pp. 93) found the gold standard second-best to his ideal of "a more or less constant volume of monetary circulation" in the world as a whole, so long as "a really rational monetary policy" of that sort "remains an utopian dream," there are merits in "any mechanical principle (such as the gold standard)" which at least has an equilibrating mechanism for distributing the global money stock among countries.

Hayek's (1937, pp. 93–94) overall judgment of the gold standard was thus ambivalent: "if it does not provide a really rational regulation of the quantity of money, it at any rate tends to make it behave on roughly foreseeable lines, which is of the greatest importance." Hayek (1948, pp. 209–19) later endorsed a multiple-commodity-reserve currency as a way to secure gold's advantages without what he saw as its remaining disadvantages.

THE DENATIONALIZATION OF MONEY

Hayek wrote very little on money (apart from one chapter in 1960's *The Constitution of Liberty*) in the three-plus decades between his 1943 article on commodity-reserve currency plans (Hayek 1948, pp. 209–19) and his 1974 Nobel Prize. In his last important work on monetary policy, *The Denationalisation of Money,* Hayek (1978) surprisingly abandoned constancy of the money stream as a norm, and embraced consumer price-level stabilization as the most desirable monetary norm, all things con-

14. Hayek never addressed the question of whether an ideal world central bank should try to offset the MV effects of secular changes in the world stock of monetary gold. Even at the global level the constant-MV norm is ultimately inconsistent with adhering to a gold standard with competitive mining and coinage.

15. Mises (1980, p. 270) made a similar argument: the value of gold does vary, but a discretionary state-managed currency "would be subject to still greater fluctuations."

sidered. He advocated allowing private firms to issue fiat-type monies chiefly on the grounds that a system of competitive issuers would more effectively achieve price-level stability than would a central bank.

Hayek's call for stabilizing *some* price level was not entirely unprecedented. As early as 1933, Hayek (1984 [1933], p. 161) had proposed that, in the real world where velocity shocks were a problem, "the stabilization of some average of prices of the original factors of production would probably provide the most practicable norm for a conscious regulation of the quantity of money."[16] Targeting an index of raw-material and other *input* prices would allow *final output* (consumer) prices to fall with increases in productivity, and would in that way approximate the intertemporal nominal price relationships Hayek sought. In *The Constitution of Liberty* Hayek (1960, p. 337) had endorsed a monetary policy goal of "stability of some comprehensive price level" over an employment goal, but was concerned that the target index "should not refer exclusively to final products (for if it did, it might in times of rapid technological advance still produce a significant inflationary tendency)," that is, might call for significant monetary expansion.

In *Denationalisation,* however, Hayek (1978, pp. 64–70) argued for the coordinating properties of price-level stability or zero inflation in *final output* prices. He abandoned his earlier position that preventing nominal output prices from falling would systematically create intertemporal misallocation. He now argued that (1) a predictable inflation rate promotes coordination in long-term contracts, (2) a zero inflation rate minimizes forecasting errors with regard to *relative* prices because many prices do not change in a given period,[17] and (3) a "tolerably stable" unit of account is needed for "effective capital maintenance and cost control." In summary, stable-valued money is preferable for reasons of "foresight, calculation, and accounting."

Serving the preferences of money-users, as Hayek now saw those preferences, requires the issuer of a money to manipulate its quantity as necessary to stabilize its purchasing power. He had pointed out in the 1930s that such a policy (which he then opposed except in response to velocity shocks) is not open to a central bank constrained by the gold standard. He now noted that it was not open to a private issuer of gold-redeemable money. Hayek (1978, pp. 126–27) consequently predicted that, in a free competition among different types of money, the public would choose stable-valued private fiat-type money over commodity money.[18]

However doubtful its forecasts, *The Denationalisation of Money* had the virtue of boldly reconceiving the debate over monetary policy as a more fundamental debate over monetary regimes. Hayek (1978, p. 98) abandoned his search for an ideal central

16. I thank Roger Garrison for drawing my attention to this passage.

17. If the rationale for sluggish price adjustment is the existence of lump-sum costs of changing nominal prices—for example, the cost of revising menus and catalogs (Hayek does cite sluggishness in the prices of "goods sold by mail-order houses")—then Hayek's argument here is a version of the "menu cost" argument for zero inflation.

18. There are at least two reasons to doubt this prediction: (1) economies of standardization or network effects will make users of an existing government fiat money reluctant to switch to *either* kind of new monetary standard (Friedman and Schwartz 1986); and (2) the pledge of a private fiat-type issuer to keep the purchasing power of its money constant is time-inconsistent, unless the issuer can enforceably precommit to a quantity path (Selgin and White 1994, pp. 1734–6).

banking policy in favor of the (more consistently "Hayekian") view that an ideal central banking policy is unrealizable for much the same reason that ideal central planning is unrealizable.

Hayek (1978, pp. 82–84) recognized that a policy of injecting and withdrawing money to stabilize its value, even as carried out by a private issuer, raised the problem of non-neutral injection effects that had been at the heart of his business cycle theory. In a remarkable about-face, he now dismissed those effects as too small to worry about:

> [E]ven those additions to the quantity of money that in a growing economy are necessary to secure a *stable* price level may cause an excess of investment over saving. But though I was among those who early pointed out this difficulty [here Hayek cites *Monetary Theory and the Trade Cycle*], I am inclined to believe that it is a problem of minor practical significance.

As he was logically compelled to do if he were to embrace consumer price-level stabilization, Hayek here essentially repudiated his earlier business cycle theory and all that rested on it, most importantly his explanation for the onset of the Great Depression (hardly "a problem of minor practical significance") as the necessary consequence of central bank stabilization experiments in the 1920s. He did not indicate what cycle theory should be put in its place. In this key respect *Denationalisation of Money* breaks radically with Hayek's earlier work. Hayek's transformation into a supporter of price-level stabilization presents a puzzle for future research.

CONCLUSION

The valid core of Hayek's 1928 argument from intertemporal price equilibrium is that price-level stabilization is inconsistent with maintaining a constant gold parity. Contrary to Hayek's suggestions, the argument does not provide a basis for criticizing the automatic working of a gold standard, nor for rejecting price-level stabilization under a fiat standard. To justify the constant-MV norm for monetary policy that Hayek supported, one might argue that money-injections distort *relative* prices, which requires relaxing his 1928 perfect-foresight assumption. For purely nominal prices to convey false signals, it stands to reason that agents must face a signal-extraction problem. In Hayek's business cycle theory (1935, 1939) injection effects and signal-extraction problems do play key roles. He thus did independently provide an analytical foundation for his critique of price-level stabilization in the context of a fiat standard. At the end of his career, surprisingly switching from critic to advocate of consumer-price-level stabilization, Hayek (1978) was compelled to deny the practical relevance of his business-cycle theory.

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