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REVIEW ARTICLE

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Interest rates or quantity of money? Edward Nelson on Milton Friedman

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1 | INTRODUCTION

Milton Friedman was awarded the Nobel prize for economics on 14 October 1976. The prize was "for his achievements in the fields of consumption analysis, monetary history and theory, and for his demonstration of the complexity of stabilization policy", to cite the commendation from the Royal Swedish Academy of Sciences (1976). That day Friedman was – in his own word – "barnstorming" in Michigan to promote a balanced budget amendment to the state's constitution. He heard about his Nobel prize in a parking lot in Detroit, where he and his hosts were amazed by a large throng of journalists.

To quote from his recollection,

> *As I stepped out of the car, a reporter stuck a microphone in my face and said, "What do you think about getting the prize?". I said, "What prize?". He said, The Nobel prize". Naturally I expressed my pleasure at the information. The reporter then said, "Do you regard this as the pinnacle of your career?" or something to that effect, and I said no. I said I was more interested in what my fellow economists would say about my work fifty years from now than about what seven Swedes might say about my work now. (Spencer & Macpherson, 2014, p. 55)*

On this basis Friedman would be pleased to hear that Edward Nelson, one of the Federal Reserve's most influential and well-regarded economists, has authored a two-volume work on

Milton Friedman and Economic Debate in the United States, 1932–1972. The work is a prodigy of scholarship, with the main text of almost 800 pages and over 400,000 words backed up by more than 275 pages of notes, a bibliography of 5,000 items and a comprehensive index. This is an outstanding contribution to the history of economic thought, as well as a remarkable and effective tribute to Friedman.

Famously or notoriously, depending on one's point of view, Friedman was controversial. But – whether one loves or loathes him – he is acknowledged to have had a double achievement matched only perhaps by J. M. Keynes in the pantheon of great economists. He both transformed the academic discipline to which he devoted his exceptional intellectual abilities, and contributed massively to the public life of his own nation, the United States of America, and to that of others, including the United Kingdom. Nelson recognises the dual nature of Friedman's career, explaining with great skill the blending and interdependence between the scholarly output and the barnstorming.

Much of the barnstorming was in the White House and on Capitol Hill, as well as in Midwest car parks, and it had major consequences for US policymaking. From the early 1950s Friedman reasserted the empirical validity of the quantity theory of money, when the consensus of his profession was against him. He then emphasised the potency of monetary policy relative to fiscal policy, and argued that monetary policy should be directed towards the attainment of price stability, not full employment. His themes formed a veritable 'monetarist counter-revolution' against 'the Keynesian revolution' inaugurated by Keynes's 1936 *The General Theory of Employment, Interest and Money*. Moreover, Friedman's messages were so effectively delivered that in the 1970s and 1980s they led to a policy refocusing along the lines he favoured. Arguably, this refocusing was responsible for the Great Moderation, a period of benign macroeconomic outcomes (with low inflation and steady growth) that lasted in the USA from the mid-1980s to the Great Recession of 2008 and 2009.

Nelson's book is impressively thorough, detailed and well-expressed, and reading it is a pleasurable immersion course in Friedman's activities. All the same, it was written by Nelson, not by Friedman. It is inevitably Nelson's interpretation of Friedman, and reflects a balance between the author and his subject. That is fair enough. But at times the balance is not right, with too much Nelson and not enough Friedman. This review will argue that, despite its author's commendable industry and the depth of his knowledge, the book is far from being the definitive intellectual biography that Friedman deserves.

2 | AN IS FUNCTION FOR FRIEDMAN

Nelson is renowned for his mastery of the modern journal literature in macroeconomics, a knowledge so encyclopaedic and extensive that it must be unique in the Federal Reserve's research departments, and may be unmatched even in academe. Unsurprisingly, he is in awe of the great names of modern macroeconomics like Hicks, Modigliani and Samuelson, who were able to put together – in his phrase – "fully-specified structural models" (i, p. 182). In macroeconomic models of this sort aggregate demand and aggregate supply are represented by equations, and the economy's equilibrium – notably *real* output and hence employment – can be described diagrammatically by the intersection of lines for the aggregate demand and supply functions. By contrast, Friedman offered reduced-form models, with one or two equations in which *nominal* output was determined above all by the quantity of money, in line with his quantity-theory commitments. Unlike structural models with many equations (and often very complex and arcane

mathematics), reduced-form models of the MV = PT variety are not altogether kosher in the top-rated journals.

Nelson views this as a weakness in Friedman's *oeuvre*, invoking the authority of Allan Meltzer to support his position. Meltzer, also a prominent figure in American monetary economics in the late twentieth century, was often on Friedman's side in policy debates. He is reported as having stated that Friedman "never developed a model". According to Nelson, Meltzer had tried to write down what he thought might be the model that Friedman and long-time co-author, Anna Schwartz, "had in mind", but had struggled. Further, these remarks meant that there was "an *implicit* model in [Friedman's] empirical and narrative work" (i, p. 182).

Nelson has therefore taken upon himself the task of providing the equations for a latter-day Friedmanite structural model. A conceptual framework which might perhaps have been in Friedman's head, but was never properly written down, is therefore to be made explicit by Nelson. In particular, the argument of chapter 5 culminates in an aggregate spending equation which determines *real* output, in the same fashion as the IS curve in Hicks's IS/LM depiction of Keynes's *General Theory*. The equation, presented in logarithmic form, makes output dependent on its lagged value, two interest rate terms, and a shock term incorporating "exogenous disturbances" to the components of aggregate demand. In Nelson's judgement, the impact of interest rates would ideally be captured by "a *vector* of interest rates, rather than a single short-term interest rate" (emphasis in original). But, in the equation as stated, the two interest rates are one short rate and one long rate, and that is all (i, pp. 226–7).

Is this equation what Friedman believed, what Nelson believes that Friedman believed, or what Nelson believes? The two-page section (on pages 226 and 227 of the first volume) containing the new IS function relies on three footnotes. The first begins, "In standard, linearized New Keynesian models, the real long-term interest rate does not matter in its own right for spending decisions; only the component of the real long-term rate that corresponds to the expected path of short-term rates does so." This proposition is attributed to a 1999 paper by Julio Rotemberg and Michael Woodford, and a 2004 paper co-authored by three economists, one of whom is Nelson himself. The following sentence does refer to a 1974 cassette tape by Friedman. But the existence of the cassette tape is news to the current reviewer and probably other economists, and frankly the reference is obscure (i, p. 531).[1] The second and third footnotes do not mention Friedman.

It is best to be blunt: the IS function on page 227 is Nelson's, not Friedman's. It is New Keynesian in spirit, and not quantity-theoretic in character or origin. Concern about Nelson's procedure is increased by the manner in which he develops – over the 45 pages that precede the crucial two pages with the equation – the case for the proposed IS function. He puts forward three "ground rules for the analysis". These are that,

> *Rational expectations will be used, and adaptive expectations will not be regarded as integral to Friedman's theory. (i, p. 188)*
>
> *The assets considered in spending and portfolio choices other than money and short-term securities will be limited to a single, long-term, fixed-interest nominal security. (i, p. 189)*
>
> *Lags from monetary policy to real GDP and inflation will not be modelled. (i, p. 191)*

Unhappily, none of these finds obvious support in Friedman's own work. Indeed, it is easy to find passages in his papers and interviews where Friedman takes an altogether different stance

from Nelson. The first and third of the ground rules are criticised in the paragraphs that complete this section, but the second is so fundamental that it necessitates a full four sections of discussion, and these sections constitute the bulk of the current review article.

Friedman equivocated about rational expectations. Sure enough, he was always complimentary to Robert Lucas, usually seen as the seminal thinker in the 'rational expectations revolution'.[2] But that is not the same thing as endorsing the idea. Rational expectations are forward-looking and based on the validity of economic theories which are assumed to be held by individuals and to determine their behaviour. Friedman instead preferred the hypothesis that expectations are adaptive and respond to past events. In his words, "the most important single thing [in understanding the short-run non-neutrality of money, and its consequent ability to cause movements in demand and output] is the tendency for expectations to be backward-looking and to be adjusted slowly". Moreover, in interviews later in his career he found "the notion of 'correct rational expectations' ... very hard to give much content to" (Samuelson & Barnett, 2007, p. 137).[3] One author (Rivot, 2016, p. 222) has used the word 'dismissal' to describe Friedman's attitude towards rational expectations, although this perhaps goes too far. A fairer way of putting it might be to say that he was curious, but sceptical.[4]

For Nelson to cast doubt on the relevance of lags to money's impact on the economy is surprising in general terms, as lags are present and obvious in any business context. It is also surprising in this particular instance, as Nelson has penned a superb seven-page account of Friedman's evolving views on the subject in chapter 15 in his second volume. Nelson deems Friedman's initial statements about lag structures – notably in a full chapter 'The lags in effect of monetary policy' in his 1969 collection of essays *The Optimum Quantity of Money* – as "precarious" (ii, pp. 232–9).[5] Nelson's reservations are well-stated and seem justified. All the same, they leave Nelson open to the charge of disloyalty, since Friedman devoted much energy to the analysis of the lags – "the long and variable lags", as he understood them – between changes in the quantity of money and changes in the price level. The quantity theory of money can be viewed mostly as a theory of the price level, but by common consent the effect of change in the rate of money growth on inflation typically comes after an effect on real output. Friedman said as much on numerous occasions (1991, p. 15).

Nelson might insist that he wants to derive an IS function relating to real output, not to make statements about the price level, and that the plethora of comments on lag structures in Friedman's papers is not germane to the IS function he is proposing. Maybe so, but Friedman (1969, p. 140) made another important and distinctive argument here. According to the evidence he had examined, the response of financial markets – notably, of stock market prices – to a change in money growth came even earlier than the response of output. This raises many questions. How do money, financial markets and the real economy interact? What were Friedman's views on the range of assets that matter in the interactions? And how does Nelson report on and handle these views?

3 | FRIEDMAN'S CONVERSION TO THE QUANTITY THEORY IN THE LATE 1940s

In his 1936 *General Theory* Keynes advanced a new theory of the determination of 'the rate of interest', by which he meant the yield on bonds. This theory – the so-called 'liquidity preference theory' – said that, in equilibrium, the rate of interest had to be such that investors were happy with the balance between money and bonds in their portfolios. When combined with the

notion that the quantity of investment was sensitive to bond yields, and that national income was a stable multiple of investment, Keynes had assembled the ingredients for the IS curve of Hicks's IS/LM construction.

In *The General Theory* Keynes had the common sense to recognise that in reality the level of the stock market was vital to business confidence and investment decisions, even if several pages mocked the stock market and its operators. All the same, in the last 15 or so years of his life Keynes made statements to the effect that money had its impact on the economy *only* through changes in 'the rate of interest', where – to repeat – this meant the yield on bonds.[6] The claim was absurd, both then, now, and in all the intervening decades. Bonds are only one asset among many, while fluctuations in the value of all the bonds held in the economy are usually less than those of *any* of quoted equities, residential and commercial real estate, and unquoted equities and business assets of all sorts.[7] (See Table 1 – relating to the American economy – for the smallness of changes in the value of households' bond holdings relative to that of other assets. In the period of 75 years covered in the table, the average annual change in the value of bonds held by households and non-profits was slightly above 0.4 per cent of net worth at the end of the previous year, if the sign is ignored. That average change is less than for any of the other asset categories included.) Nevertheless, Keynes's *General Theory* had such prestige – particularly after it was converted into textbook format by Samuelson in 1948 – that many economists were persuaded that money had its impact on the economy *only* through changes in 'the rate of interest'.[8]

Some of the best material in *Milton Friedman and Economic Debate in the United States, 1932–1972* is on Friedman's drastic change of view about money's importance in the 1940s, particularly in the three years from 1948 to 1951. Whereas as a young man Friedman was attracted to Keynesian income–expenditure theorising, he became in middle age a forthright and articulate exponent of the quantity theory of money. The major influence on this intellectual upheaval must have been evidence, evidence from statistical series mainly, but also evidence from a large body of real-world facts and figures. Surely Friedman was aware of the relatively minor role of bonds in household portfolios. Given that, it was understandable that he should see money's effects on the economy as not being exclusively via bond yields, as in Keynes's liquidity preference theory and Hicks's IS function. One of the earliest demonstrations of his

TABLE 1 Changes in value of bond holdings in total wealth movements in the USA, 1946–2020

Asset category	Average annual change, as % of net worth	Standard deviation of average annual changes
Bonds	0.42	0.38
Institutional savings	2.49	1.35
Real estate	2.00	1.49
Equities, directly held	2.14	0.99
Proprietors' equity in non-corporate business	0.99	1.06

Notes: Table refers to annual change in value of asset category held by households and non-profits, as a percentage of value of net worth at end of previous year. The change in value is irrespective of sign. Changes-in-levels series has been estimated. The Fed's own data for changes have not been used. If the actual signs of changes had been used, the relative unimportance of changes in the value of bonds would have been even clearer.

Source: Federal Reserve flow-of-funds data (particularly, page B.101; https://fred.stlouisfed.org/categories/32258). The 'institutional savings' series is the sum of the series for pension funds, insurance companies and mutual funds. Bonds are called 'debt securities' by the Federal Reserve.

more spacious and wide-ranging view was in his celebrated introduction, 'The Quantity Theory of Money: A Restatement', to *Studies in the Quantity Theory of Money* (Friedman, 1956).

4 | THE ROLE OF EQUITIES IN THE TRANSMISSION MECHANISM

Friedman used the opportunity of the 1956 restatement to propose that the quantity theory "is in the first instance a theory of the *demand* for money", while "the theory of the demand for money is a special topic in the theory of capital" (Friedman, 1956, p. 4; emphasis in original). He emphasised that he was interested in understanding the role of money "from the broadest and most general point of view", identifying four relevant forms in which non-money wealth could be held, specifically,

- bonds, with their fixed nominal interest payments;
- equities, as 'returns of enterprise',
- physical non-human capital goods; and
- human capital.

Equities were seen as being distinctive in yielding a positive real return, while physical non-human capital goods offered a return that at least compensated for movements in the price level. Changes in the price level were therefore regarded as having a significant influence, via the yields on equities and physical non-human capital goods, on the quantity of money demanded. Friedman noted towards the end of section 18 that "the attack on the quantity theory associated with the Keynesian under-employment analysis" relied on the notion that "the only role of the stock of money and the demand for money is to determine the interest rate" (1956, p. 17). This narrow understanding of money's role was indeed one of the Keynesian totem-poles that Friedman wanted to knock down. That was the rationale for tackling the subject "from the broadest and most general point of view". To put the matter another way, in his 1956 'restatement' – often seen as the launching-pad of the 'monetarist counter-revolution' – Friedman was opposed to a specification of the demand to hold money in which the only non-income variables were bond yields.

His aversion to overplaying the role of bond yields in monetary economics was reiterated in an article on 'Money and Business Cycles' (Friedman & Schwartz, 1969), first published in 1963. In this article Friedman and Schwartz offered "a tentative sketch of the mechanism transmitting monetary changes". They hypothesised two kinds of money injection, one adding to the monetary base held by the banks and through the base multiplier boosting the quantity of money, and the other a direct addition to the quantity of money through open market purchases from non-banks. In their assessment a sequence of portfolio adjustments would ensue. Banks would expand their loan books, while non-banks would shift their attention from shorter-dated, safe bonds to "higher-risk fixed-coupon obligations, equities, real property, and so forth" (1969, p. 230). The higher prices of securities would affect the valuation of all capital assets, and stimulate both consumption and investment. It followed that, "The monetary stimulus is, in this way, spread from the financial markets to the markets for goods and services" (1969, p. 231). The 'tentative sketch' did not have much traction in macroeconomic research in subsequent decades. It nevertheless anticipated many papers about 'the portfolio rebalancing channel' written about the effects of central bank asset purchases – or 'quantitative easing' – after 2008.[9]

Friedman and Schwartz placed emphasis on the need for "a much broader view" of the processes at work than was common among economists at that time, when Keynesianism was ascendant. In their view, the asset price fluctuations relevant to macroeconomic outcomes were not just of "government and private fixed-interest and equity securities traded on major financial markets", but of "other assets, including consumer durable goods, *consumer inventories of clothing* and the like" (emphasis added). Moreover, in their words "it is necessary to make [the] 'rate of interest' an equally broad construct, covering explicit or implicit rates on the whole spectrum of assets" (1969, p. 231). Alternatively put, Friedman and Schwartz thought that rates of discount applied – often tacitly – to the valuation of income streams from non-bond, unquoted assets were at least as much part of the transmission mechanism as the yields on quoted bonds. Nelson is correct when he says that they favoured a multi-yield approach. But his proposal of an IS curve with two yields *on bonds* is naughty, as it ignores the point that they regarded yields *on all assets* as vital to the analysis. Friedman and Schwartz seem to have been prepared to pay attention, as serious macroeconomists, even to the portfolio balance between money and wardrobes of fashion items![10]

Friedman's readers cannot miss frequent mentions of equity markets in his discussions of the transmission mechanism. Stocks and shares are after all more significant in household wealth than clothing! But Nelson wants to diminish the role of equities in Friedman's analysis of macroeconomic instability. He devotes several pages of his second volume to debates between Friedman and Paul Samuelson, using them to cast doubt on the place of equities in the Friedmanite transmission mechanism. Both Friedman and Samuelson had columns in *Newsweek* for many years, and Samuelson took the opportunity in the very first of these (on 19 September 1966) to insert the famous witticism that the stock market had predicted nine of the last six recessions. Nelson says that, "the quip relayed an important position – the disconnection of equity prices from US economic activity – for which many more economists would join Samuelson as advocates". He further remarks that Friedman was among these economists, with "doubts about both the dependence of the stock market on economic fundamentals, and the feedback from equity prices to the economy" that would "deepen in the late 1960s and shift him towards a very Samuelsonian perspective on the stock market's significance" (ii, p. 181).

These statements are questionable, to put it mildly. Nelson cannot dispute the remarks in the 1956 'restatement' and the 1963 'tentative sketch' which have been quoted above and speak for themselves. If his contention is to have any validity at all, it relies – as he says – on a supposed move towards "a very Samuelsonian perspective" from the late 1960s. But Nelson overlooks two examples of counter-evidence. First, the 1982 *Monetary Trends* volume (again co-authored with Anna Schwartz) presented a description of the transmission mechanism similar to that in 'the tentative sketch' almost 20 years earlier, with this description retaining an important role for equities.[11] Second, one has to wonder whether Nelson has noticed Friedman's last published academic paper, in the 2005 *Journal of Economic Perspectives* when Friedman was 93. This paper – entitled 'A Natural Experiment in Monetary Policy Covering Three Episodes of Growth and Decline in the Stock Market' (Friedman, 2005) – reviewed three periods in which stock markets had risen strongly in celebration of technological breakthroughs, but had then crashed. The first of the stock market booms was in the USA in the 'Roaring Twenties', the second in Japan in the 1990s and the third again in the USA in the 1990s. Friedman presented a chart in which he showed that quite strong money growth had continued in the USA after the bursting of the dotcom bubble in 2000 and 2001, whereas in Japan money growth had stalled from the early 1990s and in the sequel to the USA's 1929 stock market crash the quantity of money had collapsed.

It is clear from the text of the article that Friedman saw high money growth as a key driver of the rises in share prices in the booms. Moreover, he interpreted the different monetary experiences after the crashes as crucial in explaining events. The USA had recovered well after 2001, whereas it endured the Great Depression between 1929 and 1933. Meanwhile, Japan's gross domestic product had gone sideways in the 1990s, just like its money supply. In Friedman's view, here was a "natural experiment", with "the controlled conditions of the experimenter's laboratory" (2005, p. 145). To quote from the concluding paragraph of Friedman's final article, "[W]hat happens to the quantity of money has a determinative effect on what happens to national income and to stock prices" (2005, p. 150). Why would Friedman have written in these terms if, like Samuelson, he wanted to poke fun at the stock market? Friedman was a passionate supporter of free-market capitalism, of which the stock market is among the most emblematic institutions.

5 | INTEREST RATES VERSUS THE QUANTITY OF MONEY

Readers of *Milton Friedman and Economic Debate in the United States, 1932–1972* must be warned that its author attributes to Friedman views that he did not hold. Nelson has originated an IS function with two interest rate terms that is nowhere in the Friedman *oeuvre*, and defends and promotes it. This IS function belongs to Keynesian or New Keynesian thinking; it has nothing to do with the quantity theory of money. But the fundamental issue is not to determine who believed in a particular doctrine many decades ago or who believes in it now, or even to arbitrate on Friedman's exact meaning. Instead, our most basic concern – as Friedman himself would insist – must to discover how the economy does in fact behave.

Are interest rates or money-quantity variables more successful in macroeconomic explanation? One reason – almost certainly the main reason – that Friedman and Schwartz disliked appeals to interest rates in macroeconomic testing was simple, that interest rates did not work in explaining fluctuations in national income growth. To quote from a representative Schwartz paper, written on the tenth anniversary of the 1959 report of the UK's Radcliffe Committee, "The correlations between the level or rates of change in interest rates, on the one hand, and rates of change in nominal income, prices and output, on the other, are considerably worse than those between rates of change in the quantity of money and these magnitudes" (Schwartz, 1969, p. 175).

Since Nelson's second volume is dedicated to Schwartz, who is described as a "continuing inspiration", he presumably would not question this finding about the periods that she, with Friedman, examined before 1969. But Nelson's predilection for interest rates in macroeconomic explanation – and his proposal of a Friedmanite IS function – might be justified if the American economy had behaved differently since then. The necessary exercise is – for the USA in the 50 years 1970–2019 inclusive – to regress the change in GDP on the change in the quantity of money and appropriate interest rate terms. The Appendix summarises the results, using quarterly data for the annual rates of change, with the quantity of money being the broadly defined M3 concept, and the two interest rates being the levels of the Fed funds rate and the 10-year Treasury bond yield. The exercise does not pretend to be refined econometrics: its purpose is the unambitious one of comparing the relative statistical significance of interest rate and money-quantity variables in explaining the rates of change of the USA's real and nominal gross domestic product.

Anyhow the results are clear-cut. Over the 50 years the average rates of increase in money and nominal GDP were 7.3 per cent and 6.3 per cent respectively. The long-run relationship between changes in the quantity of money and nominal GDP is exactly in line with the

prognosis made by Friedman in his 1959 Millar lectures at Fordham University in New York. (Yes, exactly! In his 1959 lectures Friedman said that his favoured policy rule was for broadly defined money to grow at a roughly constant rate of between 3 and 5 per cent a year, with this intended to deliver price stability after an allowance were made for "a secular decrease in velocity" of 1 per cent a year; Friedman, 1992, p. 91.) Meanwhile the short-run relationship between changes in money and GDP was not glaringly inconsistent with theoretical preconceptions. All the regression coefficients on the money terms in six estimated equations were positive (and so correctly signed), and they met the usual significance test.[12] Table 1 shows the relationship between changes in money and nominal GDP, and reports some of its key features. However, it must be conceded that the short-run relationship was poor. Coefficients of determination of over 0.8 were obtained in two equations, but only by suppressing the intercept terms.

But – if the short-run relationship between changes in money and GDP was poor – that between the levels of interest rates and the changes in GDP was dreadful. Twelve coefficients on the interest rate terms were calculated in six equations. Of these the majority (eight!) were positive and therefore incorrectly signed. (The higher interest rates were, the faster was the rate of growth of GDP.) Of the four that had the correct sign, two can be dismissed as not meeting the usual significance test, while the two that did meet that test did so only just.[13] The conclusion has to be that Schwartz's 1969 generalisation held up in the following 50 years.

The facts prompt two questions: why make such a fuss about interest rates when considering the forces that determine GDP? And is the IS function any use at all? Nelson's answer might be that central banks – including the Federal Reserve – nowadays organise policy mainly by setting a short-term interest rate. Since the Great Recession they have also engaged in so-called 'quantitative easing' and 'quantitative tightening'. QE and QT may have effects on the quantity of money, and changes in the quantity of money alter equilibrium national income and wealth, as the reviewer – in a Friedmanite spirit – has emphasised in several places.[14] But to economists involved in contemporary central banking – for example, Ben Bernanke and Alan Blinder – the effects of QE and QT on 'the rate of interest' and credit spreads are those that matter.[15]

6 | MODERN CENTRAL BANK PRACTICE

Nelson might further claim that, since the Fed is concerned with interest rates rather than the quantity of money, he is right to advance his 'multi-yield' thesis and to concoct a Friedmanite IS function. The counter-argument is that a quantity theorist can acknowledge the pre-eminent place of the central bank's short rate in its toolkit, while still insisting that the growth rate of broad money is a legitimate intermediate policy target. Specifically, the quantity theorist might ask the central bank to raise its policy rate when money growth is so high as to be incompatible with medium-term price stability. He might also suggest that – when money growth is excessive – the central bank should ensure that new issues of public debt are entirely to non-banks and so do not result in new money creation.

Let it be admitted here that Friedman did not favour this kind of 'pragmatic monetarism'.[16] Instead he believed that central banks could achieve fairly exact money growth objectives by controlling the growth of the monetary base, since – in his view – the quantity of money was a stable multiple of the base (Friedman, 1992, pp. 32–3). This is not the place to adjudicate on the debate, important though it was in Friedman's career and his subsequent professional standing.[17] All the same, it has to be said that virtually all central bankers have rejected Friedman's and other monetarists' prescription that monetary base control should be the heart of monetary

management. Indeed, their irritation with the monetarists over this matter is part of a larger feud about the design of monetary institutions.[18] The tensions arising from the feud reflect more extensive mutual disillusionment and may go some way to explain why central bankers pay little or no attention to money aggregates in modern decision-taking.

The unhappy truth is that in the early 2020s the leading central banks are preoccupied with the relationship between interest rates and macroeconomic outcomes in New Keynesian fashion, as if the IS function had some validity. That is how central banks look at the world, even though the evidence remains just as Schwartz said in her 1969 article on the Radcliffe Report, and as both Friedman and Schwartz understood from many years of dredging up monetary data, trawling through it and trying to make sense of the material. Schwartz's words (1969) deserve repetition. "The correlations between the level or rates of change in interest rates, on the one hand, and rates of change in nominal income, prices and output, on the other, are considerably worse than those between rates of change in the quantity of money and these magnitudes." The result may have come out from naïve bivariate work of the kind which Friedman and Schwartz conducted in the 1960s and 1970s, and is nowadays derided by central bank research departments with modern and sophisticated computer gadgetry. But the Friedman and Schwartz generalisations remain correct. The implication is that the IS function is a waste of time. As it happens, economists have had trouble – even in the current New Keynesian era – in their attempts to identify a plausible IS function by rigorous econometric methods (Goodhart & Hoffman, 2005).

7 | CONCLUSION: NELSON, FRIEDMAN AND THE FEDERAL RESERVE TODAY

The previous section closed with a reference to 'the current New Keynesian era'. That may be shocking to those economists – now quite a small band – who participated in the 'Keynesianism versus monetarism' debates of the 1960s and 1970s, and who were persuaded by the main tenets of the monetarist counter-revolution in which Friedman was so important. Friedman would be grateful that – over 40 years since his Nobel prize – economists of Nelson's calibre remain excited by his work. But the truth cannot be hidden or evaded: the monetarist counter-revolution has lost its way. The monetarist counter-revolution has been succeeded by a New Keynesian counter-counter-revolution.

The Asian crisis of 1997 and 1998, and more especially the Great Recession of 2007–09, gave new impetus to the critics of the free market and cast doubt on the underlying stability of a capitalist economy. Nevertheless, even after the Great Recession a number of influential economists still adhered to 'monetarism', as they understood it. Many in this group shared with Friedman a mechanistic view of the role of the monetary base in policymaking. Some of them warned that rapid inflation would follow the implementation of QE.[19] In the year from September 2008 the USA's monetary base more than doubled, while the M1 measure of money increased in the 18 months to end-2009 by no less than 21.3 per cent. The inflation pessimists were totally wrong: the 2010s delivered the lowest inflation since the 1930s. The falsity and worthlessness of forecasts based on the behaviour of the base and M1 seems to have been responsible for discrediting altogether the monitoring of any money aggregate.[20]

Nelson does not discuss the collapse of monetarism, and indeed of quantity-theory analysis more broadly understood, in most serious academic and policymaking circles. But this collapse – which has occurred particularly in the twenty-first century – has tarnished Friedman's reputation as a heavyweight economist. That loss of reputation has occurred even though, as

suggested earlier, a case can be made that the monetarist counter-revolution was basic to the changes in policy orientation that led to the Great Moderation.

All concepts of the quantity of money are now disregarded in central bank research. The COVID-19 crisis has led to decisions, with much enlarged budget deficits being financed from banking systems, that have created new money balances on an unprecedented scale. In the year to June 2020 broadly defined money – using an aggregate usually favoured by Friedman and Schwartz, which included time deposits as well as sight deposits – surged by 26 per cent, the highest increase since 1943.[21] A handful of commentators – including the current reviewer – soon forecast that the rapid money growth would lead to buoyant asset markets and, in due course, to a major rise in inflation.[22] But in the minutes of its eight meetings in 2020, the Federal Open Market Committee made not a single reference to any measure of the quantity of money.

This review has mentioned that Nelson, an Australian by birth, is one of the Federal Reserve's top economists. In the mid-2010s he was for two years a professor at the University of Sydney. Since his return to the USA in 2017, he has been senior adviser in the Division of Monetary Affairs, with the Board of Governors of the Federal Reserve System, in Washington, DC. There is an obvious anomaly here. The author of a significant work on the twentieth-century's most celebrated champion of anti-inflationary monetary restraint is employed by a central bank that has, in 2020–21, thrown out the rule book of monetary orthodoxy and actively sought to boost inflation.

Nelson must have spent a high proportion of his time, both in Sydney and Washington, investigating Friedman's multifarious research activities 50 or more years ago. His pages reflect an amazing diligence. They include, for example, a disquisition on the effect of Regulation Q on the relative growth (calculated at six-monthly annualised rates) of M1 and M2, on 'old' and 'new' definitions, in the four years 1969 to 1972 inclusive. M1 growth in 1971 is described as "fairly slow", at just above a 5 per cent annualised rate, and M2 growth as "very rapid", at an annualised rate of almost 15 per cent (i, pp. 188–98).

But Nelson is also on the staff of the Federal Reserve, which at the time of writing (March 2021) has just reported on its website that the increase in M2 in the year to January 2021 was 25.8 per cent. (The increase in M1 on a long-standing definition in the year to January 2021 approached 70 per cent, but the Fed has responded by redefining M1 and ending publication of M1 numbers on the traditional basis.) Have he and his Federal Reserve colleagues noticed that the annual money growth rates are, by a wide margin, the highest since the current statistical series began in 1959? Have they brought the fantastic money explosion to the attention of the Fed's key decision-takers, particularly those on the Federal Open Market Committee?

Nelson's *Milton Friedman and Economic Debate in the United States, 1932–1972* is an important book. It is important for a good and positive reason: a huge amount of new and fascinating material about a great economist has been assembled between only (!) four covers. It is also important for two bad and worrying reasons. The first is that the ratio of Nelson to Friedman in the book is too high, with Nelson making friendly overtures to doctrines (New Keynesianism, the usefulness of the IS function, the centrality of interest rates in national income determination and monetary theorising, the insignificance of equities in the transmission mechanism) which Friedman disliked or even deplored. The second is an extraordinary chasm of disconnection between the book and its context. Nelson has spent much of his time and energy over several years preparing two highbrow volumes which remember Milton Friedman's life, revere his ideas and thought, and (mostly, although far from entirely) support his views. At the same time the Federal Reserve – where Nelson works in a senior role – seems determined to forget Friedman's legacy to his main field of intellectual endeavour and to trash his key policy prescriptions.

NOTES

[1] The notes are numbered 200 to 202. The text discussion relates to note 200.

[2] The key paper is usually seen as Lucas (1972).

[3] The quotations are from Friedman's responses to an interview in 2000 by John Taylor.

[4] Milton Friedman and Anna Schwartz (1982, pp. 556–7) identify "a limitation of much recent work on rational expectations".

[5] Nelson uses the word 'precarious' on page 232. Friedman's chapter 'The lag in effect of monetary policy' appears in Friedman (1969, pp. 237–60). The chapter drew on a 1961 paper in *The Journal of Political Economy*.

[6] No economist would dispute that – to the extent that increases in the quantity of money lower bond yields, in line with Keynes's liquidity preference theory – there is a positive effect on aggregate demand. But it is an extraordinary and unjustified leap to go from here to claiming that an increase in the quantity of money boosts aggregate demand *only* if it lowers the bond yield. Unfortunately, Keynes was bamboozled by his own theory and did sometimes make that leap. In February 1936, in an unpublished letter to *The Times*, he wrote, "...if the creation of credit [and money] has no effect on the rate of interest, it will have no effect on prices".

[7] The reviewer emphasised the point in his article in the February 2021 issue of this journal (Congdon, 2021; see particularly pages 25–7).

[8] The discussion of money and interest rates in Samuelson (1948, pp. 287–306) does contain an isolated reference (p. 302) to investors balancing money against equities and real estate, but the argument follows the lines of Keynes's *General Theory*. It is taken for granted that changes in money matter because, above all, they affect bond prices and yields.

[9] The reviewer noted the affinities between the portfolio rebalancing literature and Friedman and Schwartz's 1963 'tentative sketch' in Congdon (2021, pp. 30–1).

[10] A reference to clothes appears again in the 1982 *Monetary Trends*, in an account of the transmission mechanism that recalls Friedman's 1956 'restatement' and the 1963 Friedman and Schwartz 'tentative sketch' (Friedman & Schwartz, 1982, p. 58).

[11] A quotation from *Monetary Trends* says it all. In the view of Friedman and Schwartz (1982, p. 57), the Keynesians "regard spending as affected only 'indirectly' as the changed interest rate [due to a change in the quantity of money] alters the profitability and amount of investment spending...We, on the other hand, stress a much broader and more 'direct' impact on spending."

[12] The *t* statistic on the regression coefficient was above two.

[13] The *t* statistics on the regression coefficients were minus 2.50 and minus 2.80. See Appendix for details.

[14] See, particularly, Congdon (2017, chs 1–2).

[15] For Bernanke, who translates QE amounts into an effect on Fed funds rate, see Bernanke (2020); for Blinder's emphasis on credit spreads, see Blinder (2013, pp. 240–56).

[16] The term 'pragmatic monetarism' is associated with Paul Volcker, Fed chairman from 1979 to 1987. For Friedman's reservations about Volcker's period as Fed chairman, see Samuelson and Barnett (2007, pp. 117–18), reporting a 2000 interview between Friedman and John Taylor.

[17] The post-Keynesian school of macroeconomics rejects Friedman's views on the direction of causation in the money supply process, arguing that 'loans make deposits' and 'deposits make reserves'. See Lavoie (2020, pp. 39–43).

[18] Monetary base control, advocated by Friedman throughout his middle and late career, would have called into question the central bank's responsibility to ensure that commercial banks have sufficient cash always to meet their obligations. For an exchange between Friedman and McChesney Martin, Fed chairman, in the late 1950s, see Nelson (i, pp. 436–7).

[19] The inflation pessimists included the much-revered former Fed chairman, Alan Greenspan (see Greenspan, 2009). Perhaps the most prominent example of inflation pessimism was an 'Open Letter to Ben Bernanke', about QE and inflation, which appeared in the *Wall Street Journal* of 15 November 2010. The

23 signatories opined that "The planned asset purchases [in the QE programmes] risk currency debasement and inflation."

[20] Michael Woodford (2003) had argued against the policy usefulness of money aggregates well before QE. To quote from page 54, "it is possible to derive optimal policy rules that indicate how a short-term nominal interest-rate operating target should be set...without any reference to the paths of the monetary aggregates."

[21] The M3 numbers come from the Shadow Government Statistics consultancy (www.shadowstats.com).

[22] The reviewer was among these (Congdon, 2020).

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APPENDIX

The relative significance of money and interest rates in the determination of real gross domestic product in the USA, 1970–2019

The purpose of this exercise is to determine the relative significance of the quantity of money and interest rates in the determination of US real GDP in the 50 years after Anna Schwartz's 1969 generalisation that money and GDP had a better correlation than interest rates and GDP. The analysis is conducted with quarterly data.

The measure of money chosen is the sum of current and checkable deposits, time and savings deposits, and money market mutual funds, held by households and non-profit organisations, and by non-financial business, with the constituent series obtained from the Federal Reserve's flow-of-funds database. It corresponds, in other words, to a broadly defined measure of money, for which Friedman and Schwartz expressed a preference in their 1963 *Monetary History of the United States, 1867–1960*. To obtain a series for the change in real money, numbers for nominal broad money are adjusted by the change in the GDP deflator.

Two interest rate terms are chosen: the Fed funds rate and the 10-year Treasury bond yield. Their values in real terms are obtained again by adjusting for the change in the GDP deflator. Six equations are estimated for different possible combinations of real and nominal magnitudes, and the results are given in Table A1. (If the changes in real GDP were regressed on the money and interest rate variables also in real terms, the result would of course be the same as if the changes iDP were regressed on the money and interest rate variables in nominal terms.) The key results of the equations are reported below and discussed in the main text.

The generalisation made by Schwartz in 1969 continued to apply in the following five decades.

TABLE A1 Results of estimating six equations to capture effects on money and interest rates on GDP changes

	Coefficient of determination (r^2)	Value of intercept term	*t* statistic of intercept term	Value of coefficient on money term	*t* statistic of coefficient on money term
Equation with change in nominal GDP regressed on change in nominal broad money, and Fed funds rate and 10-yr bond yield in nominal terms					
- Intercept term calculated	0.49	2.18	4.44	0.21	4.66
- Intercept term suppressed	0.89	0.00	n/a	0.31	7.71
Equation with change in nominal GDP regressed on change in nominal broad money, and Fed funds rate and 10-yr bond yield in real terms					
- Intercept term calculated	0.32	4.23	8.48	0.31	6.27
- Intercept term suppressed	0.82	0.00	n/a	0.64	18.36
Equation with change in real GDP regressed on change in nominal broad money, and Fed funds rate and 10-yr bond yield in nominal terms					
- Intercept term calculated	0.11	1.26	2.94	0.18	4.44
- Intercept term suppressed	0.65	0.00	n/a	0.24	6.20

TABLE A1 *(continued)*

	Value of coefficient on Fed funds rate	*t* statistic of coefficient on Fed funds term	Value of coefficient on 10-yr T-bond yield	*t* statistic of coefficient on 10-yr T-bond yield
Equation with change in nominal GDP regressed on change in nominal broad money, and Fed funds rate and 10-yr bond yield in nominal terms				
- Intercept term calculated	0.29	2.85	0.18	1.50
- Intercept term suppressed	0.03	0.04	0.59	6.64
Equation with change in nominal GDP regressed on change in nominal broad money, and Fed funds rate and 10-yr bond yield in real terms				
- Intercept term calculated	0.50	4.16	−0.34	−2.50
- Intercept term suppressed	−0.01	−0.05	0.42	3.55
Equation with change in real GDP regressed on change in nominal broad money, and Fed funds rate and 10-yr bond yield in nominal terms				
- Intercept term calculated	−0.09	−0.98	0.20	1.78
- Intercept term suppressed	−0.21	−2.80	0.45	6.00

Sources: Federal Reserve flow-of-funds data, and FRED database for Fed funds rate, 10-year T-bond yield and GDP deflator