Credit and Capital Markets, Volume 52, Issue 1, pp. 69–87
Scientific Papers

New Chicago Views on Inflation Control: The Neo-Fisherian Approach and the Fiscal Theory of the Price Level

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Abstract

Whereas in former times, the 'Chicago View' in monetary policy stood for the Quantity Theory and money supply control, it is now the centre of unconventional approaches in macro theory. The Neo-Fisherian proposal suggests, in the case of low inflation and nominal interest rates pegged to the zero-lower bound, to increase policy rates immediately to the long-run equilibrium value that corresponds to the 'natural' real interest rate and the inflation target. The Fiscal Theory of the Price Level believes that goods prices jump to a level that validates the long-run sustainability condition of government debt even if central banks abstain from monetising. Both views are criticized for analytical and empirical reasons.

Inflationskontrolle aus Chicago-Sicht: Der neue Fisher-Ansatz und die Fiskalische Theorie der Preise

Zusammenfassung

Während in früheren Zeiten die 'Chicago-Sicht' in der Geldpolitik für die Quantitätstheorie und das Konzept der Geldmengensteuerung stand, werden heute damit unkonventionelle Positionen in der makroökonomischen Theorie assoziiert. Der neue Fisher-Ansatz empfiehlt, im Fall niedriger Inflation und einer Beschränkung durch die Null-Zins-Grenze die Zentralbankzinsen direkt auf das Niveau anzuheben, dass durch den 'natürlichen' Realzins und die Zielinflationsrate bestimmt ist. Die Fiskalische Theorie der Preise behauptet, dass das Güterpreisniveau auf einen Wert springt, der die langfristige reale Tragfähigkeit der Staatsschulden sichert, selbst wenn die Notenbank keine Monetisierung betreibt. Beide Positionen können empirisch nicht überzeugen und werden einer analytischen Kritik unterzogen.

Keywords: unconventional interest rate policy, inflation expectations, government budget constraint

JEL Classification: E52, E58

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I. Introduction[1]

Chicago views on inflation control for a long time have been associated with the work of Milton Friedman (who for decades held a chair at this city's famous university). Money growth targeting however is no longer practised. But also interest rate policy with its implication of endogenous central bank money supply met with difficulties in recent years due to the risk of deflation and nominal interest rates pegged to the zero-lower bound. Therefore, a bundle of unconventional monetary policies has been employed in many countries, with some moderate success.

There are new voices from Chicago University, namely from John Cochrane, propagating a radical U-turn of interest policy: the idea of creating inflationary expectations by promising to keep central bank interest rates low for a long time should be replaced by a courageous step of *raising* policy rates directly to the level implied by the equilibrium real interest rate and the target inflation rate. As this level of the nominal interest rate conforms to the well-known Fisher effect, the recommended – but up to now never implemented – policy approach is named Neo-Fisherian.

Cochrane also adheres to a new school of economists who – contrary to Friedman – regard fiscal policy or, more precisely, the state and path of government debt as a key factor in explaining the value of money. The Fiscal Theory of the Price Level claims to determine goods prices by an equation capturing the intertemporal budget constraint of government finance, an hypothesis that is not conditioned on debt monetising on the part of the central bank.

In both cases we find the use – perhaps the misuse – of long-term equilibrium relations, coupled with the indispensable assumption of rational expectations, from which conclusions are drawn for macroeconomic policy. There is little empirical confirmation for both views on inflation control; market agents, if asked, most probably would rate also the analytical relationships as dubious – but both approaches rank high in professional macroeconomic theory.

The program of this paper is to discuss the key elements of these views and to make the doubts on their limited value comprehensible. The paper starts with a brief look on the strategy of Forward Guidance, in order to highlight the difference to the Neo-Fisherian approach, and closes with some prospect of monetary policy steering its course 'back to normal'. The slow return of inflation allows central banks to dispense with unconventional policies, whether propagated from Chicago or elsewhere.

[1] The following contribution is a modified and (hopefully) improved version of the Discussion Paper *Spahn* (2018). I am grateful for helpful comments by Gerhard Illing, Malte Krüger, Franz Seitz, Jörg Thieme, Carl Christian von Weizsäcker and an anonymous referee.

II. Forward Guidance Under Dispute

Unconventional monetary policy is being practised now for so long a period that it almost has become conventional. Seen from a more technical point of view, these policies were required because the usual employment of central bank instruments was obstructed by a kind of a 'corner solution': facing low inflation and conjecturing a negative equilibrium real interest rate, the choice of an appropriate nominal interest rate was subject to a zero-lower bound restriction.

A strategy to overcome this predicament was to embark on a course of Forward Guidance. Here, the policymaker wants to announce an *overshooting* of inflation in relation to the target for a considerable time period. The aim to let the economy recover from a deep-seated crisis requires a particularly low real interest rate. A credible announcement of keeping the central bank's policy rate below the Taylor rate that corresponds to the primary inflation target π^*, even when a constellation of macro equilibrium, full employment and $\pi = \pi^*$ is reached, is supposed to push inflationary expectations beyond the target rate.

This strategy is encumbered with a series of problems. First, one needs to control the term structure in order to preclude the impact of the Fisher effect on the long-term bond rate. Second, there is a time inconsistency problem as the policymaker has no incentive to maintain low policy rates when the macro equilibrium with $\pi = \pi^*$ is reached; anticipating such a 'cheating' behaviour, the public will distrust any announcement pointing to inflation overshooting (*Illing* 2015).

A third question is whether market agents place too much confidence in policy communication at all, irrespective of its intentions. The key weakness of Forward Guidance is the assumption of rational expectations coupled with a generally shared belief that monetary policy is technically able to control the rate of inflation. But in fact, it seems awkward in a sticky zero-inflation constellation to announce an inflation rate overshooting the target when the central bank obviously and steadfastly fails to reach even this target. *Gertler* (2017: 3) concludes that "individuals need direct evidence that the central bank is capable of moving inflation to target" – but in this case, a macroeconomic control problem that needs to be solved does hardly exist. In a model with hybrid beliefs, compiled by rational and adaptive expectations where the latter respond to forecast errors, he finds a much weaker effect of Forward Guidance. Empirically, overshooting inflation expectations, which might serve to confirm a successful employment of that strategy, cannot be found in the data (*Boneva* et al. 2016; *Figure 1*).

A more fundamental critique of a strategy of keeping interest rates 'low for longer' starts from an acknowledgement of possible multiple equilibria in the macroeconomic system. Following Wicksell, equilibrium can be defined via a specific value of the real interest rate r^* (possibly negative). Standard monetary policy nowadays aims to stabilise market real interest rates around r^* so that

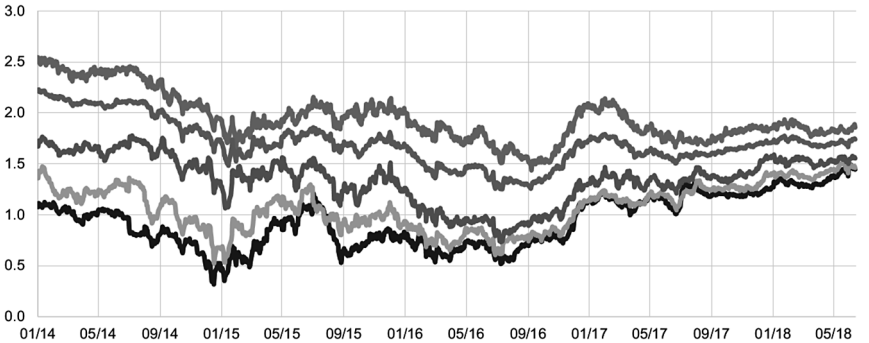

Figure 1: Market-Based Measures of Inflation Expectations, Lines Indicate (from Above): One-Year Rate Nine Years Ahead, Five-Year Rate Five Years Ahead, One-Year Rate Four Years Ahead, One-Year Rate Two Years Ahead, One-Year Rate One Year Ahead (ECB Economic Bulletin, 4, 2018: 25)

$r > (<) r^*$ ensues in times of $\pi > (<) \pi^*$. Transposed to nominal interest rates i, this implies the Taylor Principle of responding disproportionately to inflation. The 'good' equilibrium G thus is given by the intersection point of the Taylor interest rate function $i_{Taylor} = f(r^*, \pi, \pi^*)$ and the Fisher Equation $i_{Fisher} = r^* + \pi$ (*Figure 2*).

Because of the restriction $i \geq 0$, there is necessarily a second intersection point, a 'bad' equilibrium B with $r = r^*$, no matter whether i_{Taylor} shows a kinked form or has a smoothly increasing slope.[2] If the economy for whatever

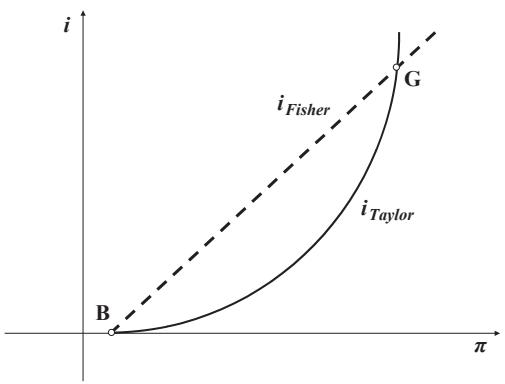

Figure 2: Multiple Equilibria of Nominal Interest Rate and Inflation, Determined by the Fisher Equation and A Non-Linear Taylor Rule

[2] With $r^* > 0$, B determines an equilibrium *deflation* rate.

reason has settled in B, the task of escaping from it obviously is non-trivial (*Benhabib/Schmitt-Grohe* 2001; *Bullard* 2010, 2015; *Williamson* 2016). In case of multiple equilibria, market agents' expectations gain in importance. The question is whether they can be manipulated to bring about a 'regime switch' from the bad to the good equilibrium.

III. The Neo-Fisherian View

1. Turning Arbitrage Upside Down: The New Keynesian Model as Bubble Economics?

The Neo-Fisherian (NF) view differs crucially in its policy recommendation from Forward Guidance: interest rates should not be kept 'low for longer' but rather immediately be increased to the level $i = r^* + \pi^*$. In order to grasp the scientific background of the proposal, it is useful firstly to take a look at a controversy on the dynamic structure of modern macro theory. The standard linear New Keynesian model (1) consists of a supply function, a demand function and an interest rate rule, where E_t is the expectation operator.

$$
\begin{aligned}
\pi_t &= \beta\, E_t \pi_{t+1} + \alpha\, y_t + \varepsilon_t^s \\
y_t &= E_t\, y_{t+1} - \sigma\left(i_t - E_t \pi_{t+1} - r^*\right) + \varepsilon_t^d \\
i_t &= r^* + \pi_t + \tau_\pi\left(\pi_t - \pi^*\right) + \tau_y\, y_t
\end{aligned}
\tag{1}
$$

In a more compact vector-matrix notation this can be written as

$$
\mathbf{v}_t = \mathbf{A}\, E_t \mathbf{v}_{t+1} + \mathbf{b}\pi^* + \mathbf{C}\mathbf{s}_t \tag{2}
$$

where $\mathbf{v}_t$ ($E_t \mathbf{v}_{t+1}$) denotes the vector of (next period's expected) inflation π_t and the output gap y_t; is the vector of white-noise supply and demand shocks, ε_t^s and ε_t^d, respectively. All model parameters (defined as non-negative) are captured by the matrices **A** and **C**, and the vector **b**; α denotes the slope of the supply function, depending on market structure and price setting conventions; σ expresses the intertemporal elasticity of consumption, taken from households' optimisation calculus; the discount factor is $\beta < 1$. The short-term nominal interest rate i_t is set by the central bank; the equilibrium real interest rate r^* drops from the equations after inserting the interest rate rule into goods demand. Ignoring shocks, the solution[3] can be calculated as

[3] **I** denotes the unity matrix. With $\beta < 1$, the solution deviates slightly from the ordinary equilibrium value $y_t = 0$, which is implied by the money neutrality proposition (*Woodford* 2003: 246).

$$\mathbf{v}_t = \begin{bmatrix} \pi_t \\ y_t \end{bmatrix} = (\mathbf{I} - \mathbf{A})^{-1}\, \mathbf{b}\, \pi^* = \begin{bmatrix} \pi^* \\ 0 \end{bmatrix} \quad \text{if} \quad \beta \to 1 \tag{3}$$

Dynamic stability requires both eigenvalues of matrix **A** to be smaller than unity. With regard to the reaction coefficients τ_π and τ_y, this implies that the Taylor Principle holds:

$$\tau_\pi + \frac{1-\beta}{\alpha}\tau_y > 0 \tag{4}$$

If the variables of a dynamic system (2) are not pre-determined but depend on expectational leads only, besides the fundamental solution (3), there is formally always a bubble solution showing an explosive path of endogenous variables. Solving [2] for $\mathbf{v}_{t+1} = E_t \mathbf{v}_{t+1} - \mathbf{e}_{t+1}$, where $\mathbf{e}_{t+1}$ indicates expectational errors, and transposing backwards for one period, yields a difference equation, the dynamics of which are determined by past values.

$$\mathbf{v}_t = \mathbf{A}^{-1}\, \mathbf{v}_{t-1} - \mathbf{A}^{-1}\, \mathbf{b}\, \pi^* - \mathbf{e}_t - \mathbf{A}^{-1}\, \mathbf{C}\, \mathbf{s}_{t-1} \tag{5}$$

The value $E_t \mathbf{v}_{t+1}$, built from (5), satisfies equation (2). The process (5) therefore represents a formal solution of (2); but it is explosive, contrary to (3). The eigenvalues of $\mathbf{A}^{-1}$ are not both smaller than unity, just because equation (4) holds, i. e. the Taylor coefficients are positive. From this, *Cochrane* (2011) concludes that hyperinflation and deflation cannot be excluded in case of Taylor interest rate policies; the emphasis given to the fundamental equilibrium solution (3) is but a convention, warranted for economic policy reasons.

It should be stressed that the foregoing argument represents a minority view in modern macro theory. A key objection is that the system of equations cannot simply be 'inverted', so that (5) ensues, because economic causality in New Keynesian Macroeconomics states that inflation and output are determined by their expectational leads, but not by an extrapolation of their past values. Equation (5) thus suggests the wrong logic of market behaviour (*Woodford* 2003: 128). *Cochrane* (2011: 582) however sticks to a pure mathematical view when he states that "the equations of the model do not specify a causal ordering".[4]

Lending support to Cochrane's view requires the assumption that market expectations follow the process, described by (5), and derive a further increase of

[4] Cochrane's reluctance to follow the ordinary understanding of the New Keynesian system can perhaps be explained by his scientific background as a financial market economist: the formal structure of the New Keynesian model resembles the well known asset valuation equation, which also is purely forward looking, and might switch to bubble paths in case of severe market shocks.

inflation from its increase in the past. If however the central bank exerts constraints on output and inflation through higher real interest rates in that case, rational expectations will be anchored on equilibrium values, captured by (3). Hence, in a scenario of sticky prices, which is the standard assumption in New Keynesian Macroeconomics where monetary policy has some control over the real market interest rate, Cochrane's argument should be rejected (*McCallum* 2009).

Circumstances might be different however if markets are characterised by perfect price flexibility. With the parameter α approaching infinity, output equals its equilibrium level, i. e. $y_t = 0$, and the supply function drops from the New Keynesian system (1). The consolidation of the demand function (simplified by omitting shocks)

$$0 = -\sigma\left(i_t - E_t \pi_{t+1} - r^*\right) \tag{6}$$

and the interest rate rule (where the response to the output gap is ignored because $y_t = 0$ is seen to be maintained by flexible prices)

$$i_t = r^* + \pi_t + \tau_\pi \left(\pi_t - \pi^*\right) \tag{7}$$

yields, after eliminating the nominal interest rate, the relation

$$\pi_t = \frac{1}{1+\tau_\pi} E_t \pi_{t+1} + \frac{\tau_\pi}{1+\tau_\pi} \pi^* \tag{8}$$

This is a purely forward-looking equation, with the fundamental solution

$$\pi_t = \pi^* \tag{9}$$

which is convergent because of $1/(1+\tau_\pi) < 1$.

But again, as in (5), there is a hypothetical bubble path corresponding to (8) where $\omega_t = E_t \pi_t - \pi_t$ shows the expectation error:

$$\pi_t = (1+\tau_\pi)\,\pi_{t-1} - \tau_\pi\,\pi^* - \omega_t \tag{10}$$

Here inflation is a diverging process on account of $1+\tau_\pi > 1$. For Cochrane, this is a realistic threat. He interprets the modified demand equation (6) as the permanently satisfied condition of Fisher's Nominal Interest Theorem, whereby the market real rate of interest then no longer performs as a macroeconomic control variable.

But this interpretation is questionable. In Fisher's theory, the long-term nominal interest rate is an endogenous variable, determined by the (fixed) real rate

and expected inflation; but in (7) i_t represents the short-term policy rate that is fixed by the central bank responding to the inflation gap, and a long-term rate is missing. Hence, equation (6) can only hold if expected inflation adjusts to the policy interest rate, i. e. $\Delta E_t \pi_{t+1} = \Delta i_t$. This is the core of *Cochrane's* message (2016: 2): "In a frictionless model, the real interest rate r_t is unrelated to monetary policy and inflation. So, if the Fed sets the nominal rate i_t, expected inflation must follow." Fisher's arbitrage theorem is turned on its head – or simply ignored because the long-term interest rate is excluded from the model. If this scientific twist is accepted, everything else seems to follow inevitably: as the interest rule prescribes $\Delta i_t = (1 + \tau_\pi)\,\Delta \pi_t$, any shock would trigger cumulative inflation driven by Taylor-oriented central bank policies – indeed a paradox result.

Of course, this scientific twist can and should be disputed. At first glance, just like the policy rate i_t, inflation expectation $E_t \pi_{t+1}$ in (6) is an exogenous term: we cannot force market agents to hold a particular expectation, just in order to keep some model's equation in balance. In formal terms, (6) simply is over-determined and cannot describe any market behaviour. Still it is an open issue how a value for $E_t \pi_{t+1}$ will be found in the market sphere. If the central bank is unable to control the real interest rate, agents likewise cannot assume that inflation is driven by monetary policy. If persistent shocks are excluded, one might say that inflation is indeterminate. But this is exactly what lends support to the establishment of the fundamental solution $\pi_t = \pi^*$, as a kind of conventional or sunspot equilibrium.

To summarise, it is surely innovative to describe the New Keynesian model as a bubble-prone system, but the scientific practice simply to invert the causal ordering of macroeconomic equations is hardly convincing. Moreover, the assumption necessary to lend at least some integrity to the bubble view, perfect price flexibility, is far beyond any empirical backing. This is not a question of a reasonable estimate of the slope of the economy's supply function, but of acknowledging the character of that economy: *Cochrane's* two-equation model represents an auction-type system with given endowments, but no market economy where supply flows steadily from a production process.

Nevertheless, the preceding discussion serves to give a useful background for a minority approach in monetary policy debates that urges central banks to *raise* policy rates in order to achieve an escape from a low-inflation, low-employment macroeconomic scenario: here, nominal interest rates are regarded as determinants of, rather than being determined by, inflation expectations.

2. Raising Inflation Through Higher Interest Rates?

Cochrane (2016) and his adherents assume the Fisher Equation to be a stable long-term relationship that has a strong bearing on market agents' beliefs and behaviour. According to that view, a central bank that sticks to a zero-interest-rate policy, aiming to trigger a macroeconomic expansion, unintentionally contributes to the persistence of stagnation; agents are supposed to deduce from a low policy interest rate via the Fisher Equation that the true inflation target also is low. Central banks should no longer apply the Taylor Principle as $\tau_\pi > 0$ might lead to cumulative instability, but are urged to choose the policy rate level directly according to $i_t = r^* + \pi^*$. This is said to help to anchor inflation expectations at the old target level, i. e. $E_t \pi_{t+1} = \pi^*$, and thus preclude slipping off into deflation.

The latter recommendation of course contradicts the standard wisdom of stabilisation policy where rising interest rates at least in the short run lead to a macroeconomic contraction. Market agents in general will side with this view, even if they believe that in the long run the Fisher Equation holds. Thus there is a puzzle, which should be resolved: do people consider interest rate increases to be of short-run or long-run duration?[5] Do people really think in terms of long-term macroeconomic laws? Do they believe in the ability of central banks to steer the economy according to their targets, so that market expectations adjust perfectly to communicated changes in the realm of policy aims and tools?

Critics regard macroeconomic analyses with perfect-foresight equilibria less useful for practical purposes. Among others, *García-Schmidt/Woodford* (2015) retreat also from the rational-expectations principle, which has been an apparently indispensable cornerstone of macro theory since the 1980s. They propose the analytical tool of 'temporary reflection equilibria' representing a permanent learning process of market agents. As already mentioned in the debate on Forward Guidance, this return to an advanced version of the adaptive-expectations view rules out that simply communicating new policy target values or new durations of policy instrument operations will help to overcome a low-inflation stagnation. In particular, *Woodford* (2018) shows that if people

[5] "Nominal interest-rate increases that are expected to be temporary, lead, in accordance with conventional wisdom, to a temporary increase in real rates that is contractionary and deflationary. By contrast, nominal interest-rate increases that are perceived to be permanent cause a temporary decline in real rates with inflation adjusting faster than the nominal interest rate to a higher permanent level. […] Credible announcement of a gradual return of nominal rates to normal levels can bring about a swift convergence of inflation to its target level without negative consequences for aggregate activity" (*Uribe* 2017).

are not assumed to optimise over infinite planning horizons, NF predictions vanish.[6]

A model-based analysis of the NF promise is a difficult task. The macroeconomic constellation of countries that are in need of unconventional stimulus is best to be described as 'below equilibrium'. Modern macro theories however start their considerations and simulations from equilibrium, as a rule, and they exhibit the feature that central banks are able to realise any inflation target they wish to put up; the recent constellation in some countries therefore cannot easily be captured.[7]

With that proviso, one might have a look at the consequences of a change of the inflation target in a standard New Keynesian model where the implicit assumption is that the economy is in a low-inflation equilibrium at $\pi_t = \pi^*$; the central bank announces a higher rate for a variable length of time. The model simulation explores how the path of the nominal policy interest rate has to be designed.[8] For that purpose, the model presented above is enriched in order to capture the effects of different market structures and market behaviour. Some dose of persistence $0 < \theta < 1$ has been incorporated in the supply and demand functions, a modification that finds justification in various analytical arguments and empirical findings.

$$
\begin{aligned}
\pi_t &= \beta(1-\theta)E_t\pi_{t+1} + \theta\pi_{t-1} + \alpha y_t + \varepsilon_t^s \\
y_t &= (1-\theta)E_t y_{t+1} + \theta y_{t-1} - \sigma(i_t - E_t\pi_{t+1} - r^*) + \varepsilon_t^d \\
i_t &= r^* + \pi_t + \tau_\pi(\pi_t - \pi_t^*) + \tau_y y_t
\end{aligned}
\tag{11}
$$

The inflation target now follows an AR(1) process

$$
\pi_t^* = \varphi\pi_{t-1}^* + \delta_t \tag{12}
$$

where δ_t indicates a one-time deviation that persists depending on $\varphi \leq 1$.

The simulation shows the expansionary result of a target innovation δ_t that necessarily forces an adjustment of the nominal interest rate path (*Figure 3*). An

[6] The literature on macroeconomic learning generally shows that many of the standard rational-expectation results have to be modified substantially when agents decide under data and/or model uncertainty (*Evans*/*Honkapohja* 2006; *Busetti* et al. 2017; *Eusepi*/*Preston* 2018). Recently research has also focused on experimental learning (*Amano* et al. 2014; *Lagos*/*Reuben* 2016).

[7] For this reason, it is questionable whether *Figure 2* above is useful to fully grasp the economic policy problem under consideration. The low-inflation equilibrium B is accompanied by full employment in theory, but less so in reality.

[8] For similar exercises see *Hagedorn* (2011), *Amano* et al. (2016), *Gabaix* (2016), *Gerke*/*Hauzenberger* (2017) and particularly *Garín* et al. (2018).

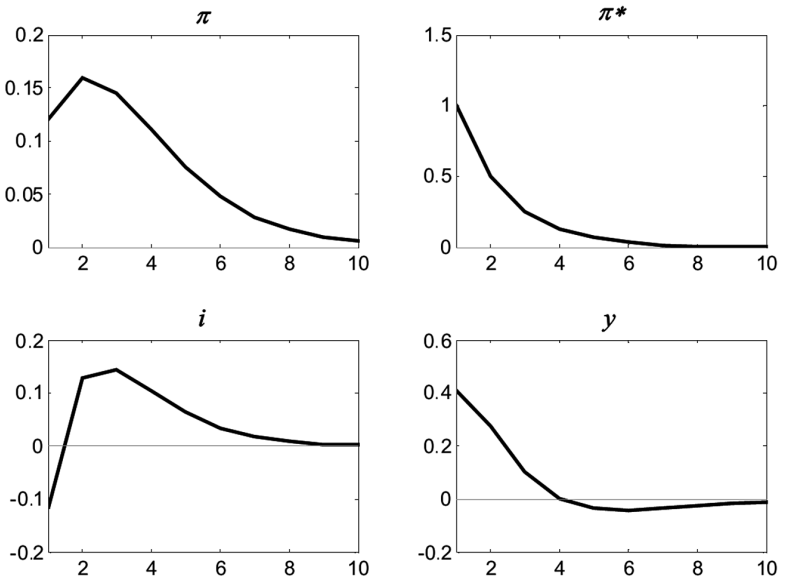

Figure 3: Model Simulation (Deviations from Steady State) After Temporary Change of Inflation Target

arbitrary, middle-of-the-road choice of parameters[9] confirms the traditional finding that a lowering of the rate is required to stimulate the economy – this contradicts the NF view where nominal rates should be raised right from the start.

Of course, the results depend on chosen parameters. In accordance with what has been found in the literature[10], a flat supply curve (low α), a large weight given to output persistence and adaptive expectations (high θ), a weak response to the output gap (low τ_y), and a high probability of quickly returning to the old inflation target (low φ) contribute to counter the NF proposal (*Figure 4*). Conversely, these results support the current practice of central banks to keep interest rates low.[11]

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[9] Estimations of parameter values of small aggregated models show a large range. In the following, medium values were taken from *Evans*/*Honkapohja* (2006) and *Holtemöller* (2008: 223) who in turn refer to various studies. The simulation starts with $\alpha = 0.1$, $\beta = 0.99$, $\sigma = 1$, $\tau_\pi = \tau_y = \theta = \varphi = 0.5$, and consequences of modified values are displayed in *Figure 4*.

[10] See footnote 8.

[11] The probably deleterious consequences of persistent low interest rates for allocative efficiency and dynamic stability of asset markets are beyond the focus of the current paper.

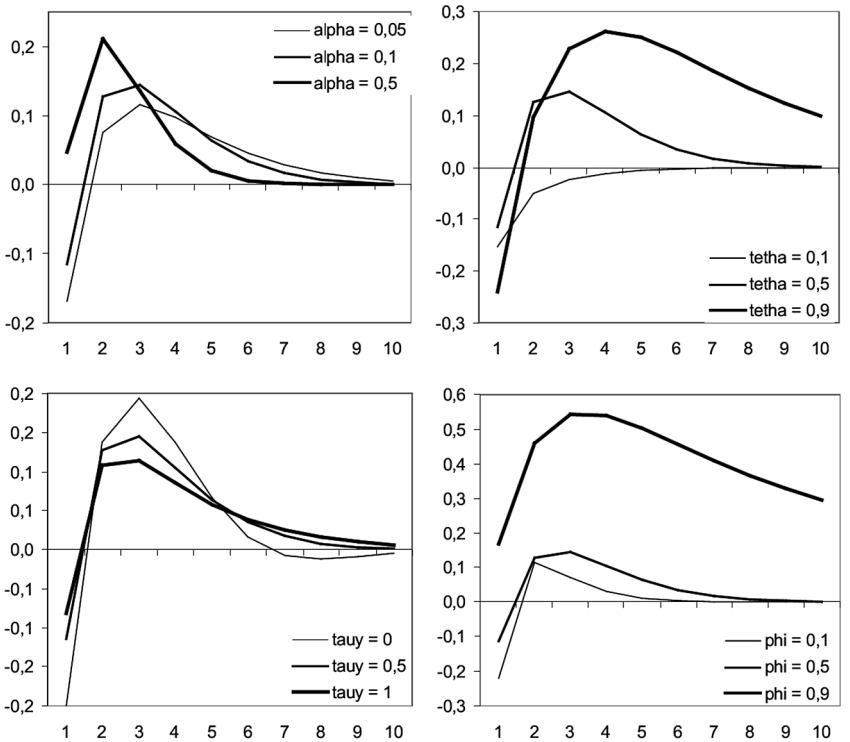

Figure 4: Nominal Interest Rate Path With Parameter Values Different from Figure 3

Taking stock, the proposal urging central banks to raise interest rates to a level that conforms to the Fisher Equation and the warranted inflation target $\pi^* > \pi_t$ seems to assume that people build their expectations by looking at long-run equilibrium conditions in economic theory. There is little empirical support for such a view. Even if agents agree that a higher level of inflation will also lead to a corresponding nominal interest rate, they will hesitate to believe that higher interest rates now will bring about higher inflation. It is a case of attaching a false causation to an arbitrage relationship.

IV. Misreading Intertemporal Equilibrium Conditions: The Fiscal Theory of the Price Level[12]

At a first glance, the Fiscal Theory of the Price Level (FTPL) seems to drop from the list of modern views on central bank policies as it apparently deals with fiscal policy. But there are two arguments that justify its inclusion in the program of this paper. First, economists like *Cochrane* (2016) who deny that Taylor interest rate policies can determine inflation (*section III*) resort to FTPL when they are asked how to explain the value of money. Second, it will be shown that the FTPL argument implicitly depends on the assumption that some monetary authority pegs the face value of government bonds; therefore the approach has a close link to monetary policy.

Exploring the path of origin of the FTPL idea, some roots can also be found at Chicago University: there is a Working Paper by *Woodford* (1988), which is listed among the important early contributions to this approach; others are *Leeper* (1991) and *Woodford* (1995). FTPL has been incorporated in complex macro models, but the main tenet, propagated now by *Cochrane* and others, is to derive the level of prices, contrary to the Quantity Theory of Money, from the state of public finance, i. e. from a condition of intertemporal sustainability of government debt.[13] The following remarks focus on this key aspect. It is assumed that the real value of nominal current debt B_t should be equal to the discounted sum of all future real budget surpluses X_t.

$$\frac{B_t}{P_t} = \sum_{j=1}^{\infty} \frac{X_{t+j}}{\left(1 + r_{t+j}\right)^j} \tag{13}$$

The equation follows from a standard intertemporal optimisation approach where the transversality condition states that at the end of its economic life no agent is allowed to have a net-debtor status. Analogously to the one-equation approach of the Quantity Theory, the price level P_t is taken as the final endogenous variable, which suggests its determination through the other terms of the equation. A fiscal shock that increases the current budget deficit and thus the nominal stock of debt B_t requires higher prices today if the whole future surplus is unchanged.

Is this more than an "accounting gimmickry without substantive interest" (*Christiano*/*Fitzgerald* 2000: 8)? To begin with, equation [13] states an overly strict condition. In the realistic case of infinite time perspective, it is not necessary that debts ever be refunded. The long-run sustainability condition then is

[12] This section draws on a Chapter in *Spahn* (2017).

[13] Equation [13] in the literature sometimes is also named the intertemporal budget constraint of government.

given by a positive gap between the economy's growth rate and the real interest rate (*Blanchard*/*Fischer* 1989: 127). Moreover, this is a medium-run benchmark; if hurt, there is enough time for a government to design a consolidation program.

FTPL takes no explicit stand in the well-known debate on 'monetary versus fiscal dominance', i. e. the question whether a central bank is able to preserve its independence in relation to government and its wishes to rely on monetary policy support with regard to debt finance. Contrary to the *Unpleasant Monetarist Arithmetic* of *Sargent*/*Wallace* (1981), FTPL at first does *not* assume that the central bank increases money supply and prices, aiming to make real public debt sustainable; also there is no expected monetisation. How then do the variables in [13] match? The equation "can be satisfied as long as P jumps [!?]. This is what FTPL advocates expect would happen. […] The market will generate a value of P to guarantee debt is not excessive. […] The market-clearing mechanism moves the price level, P, to restore equality" (*Christiano*/*Fitzgerald* 2000: 7, 3).

Taking the price level as a jump variable (beyond an endowment model) contradicts empirical findings and analytical traditions. But the key problem is to give an explanation of price increases. They do not simply reflect fiscal excess demand or additional private spending motivated by some wealth effect; rather, the idea seems to be that agents scale up prices from the supply side because the alternative – an unchecked growth of real public debt – is unconceivable and unwanted.

But why should we see private agents repairing the government budget constraint by way of raising prices, thus depreciating their own money wealth, if they do not expect monetary impulses on the part of a central bank? It is hardly comprehensible to regard the goods price level as a risk-adjusting parameter of bond prices. It is more obvious that market agents try to sell these bonds so that equation [13] is met by a direct depreciation of B_t. "The government's intertemporal budget constraint becomes a pricing kernel for the public debt, determining the effective value of the public debt and overriding its notional or contractual value" (*Buiter* 2002: 461; cf. *Buiter* 2017).

A point of concern is the maturity of the existing stock of government debt. If it consists of typical long-term bonds, there is no escape from the conclusion that flexible bond prices will respond to fiscal policy news. However, in the special case of one-period bonds, one might argue that their price in period t is given from the end of $t-1$. Refunding, i. e. roll-over of the whole public debt, takes place at the end of each period. But if bad news on *future* fiscal deficits comes up at any date, bond prices also will fall immediately because traders expect a shortage of forward-looking investors at the end of the current period (so that debt roll-over fails at constant interest rates). Thus bond prices cannot stay constant if there is free market trading.

It is thus no surprise that it is difficult to find empirical evidence of FTPL. Particularly in the euro crisis, we did not witness rising good price levels in countries that were hit by severe solvency shocks with respect to their government bonds. *Leeper*/*Leith* (2017) resort to manipulating the discount rate in order to embellish the interpretation of the data.

On account of this muddle, a tolerable view on FTPL is that it builds implicitly on the assumption of an institutional agent who precludes government bankruptcy (*Bassetto* 2008). The postulate of a constant nominal value of B_t in FTPL points to the role of the central bank. If nominal bond prices are fixed by monetary policy operations, the prediction of rising goods prices – in the case where fiscal authorities seem to live beyond their long-term budget constraint – is in line with standard macroeconomic wisdom. The monetarist transmission mechanism between money and prices will apply. Observing a mispricing of securities, asset holders will sell government bonds to the central bank and switch to other assets or even goods, which brings about excess demand. We are back in the scenario of monetising government debt.

V. Closing Remarks

The NF view turns traditional interest rate policy on its head and – in contrast to Forward Guidance – calls for higher, not lower rates. If the nominal interest rate immediately is raised to the Fisher Equation level corresponding to the inflation target, market agents – understanding that the economy will soon settle down in a long-term equilibrium are said to adjust their inflation expectations, and this will help to bring actual inflation on track. However, as the endogenous long-term interest rate is missing in the model, the Neo-Fisherian approach is not Fisherian after all. Moreover, one may doubt that individuals think in terms of analytical equilibrium conditions; at most they might have learnt that interest rates are moved to *counter* any path of inflation. Therefore a NF policy experiment most probably would be counterproductive.

Also FTPL seems to be on the wrong track. It states that the goods price level always 'jumps' to a value that solves the intertemporal equilibrium condition of public finance, namely that the real value of discounted future budget surpluses 'backs' any current budget deficit. The key objection here is that any doubt with respect to the sustainability of government debt will impact on the market price of government bonds, and not (primarily) on the price level of goods. It should be stressed that this critique of FTPL in no way downgrades the relevance and the threat of fiscal dominance. This scenario describes an active support of government bond financing on the part of the central bank; but the FTPL claim was that goods prices move without monetary policy intervention.

At first sight, it is difficult to detect a common thread that links both approaches. They build on assumptions that grow out of a mixture of model-consistent rational expectations, unfounded trust in policy announcements, and long-term equilibrium conditions, spelled forward and/or backward looking, that markets agents are supposed to believe in. Most probably, macroeconomic relationships between markets and policies work in a more old-fashioned way (*Krugman* 2018).

Analytically, New Keynesian models often over-simplify matters by assuming rational expectations whereby trend inflation is identified with the central bank target. The model modification presented in (11) instead allows for a hybrid mechanism of expectation formation. This setup can be further elaborated by establishing a variable size of groups of agents who practice rational and adaptive expectations (the parameter θ was fixed in the model (11) above). It is an obvious idea to let agents choose their preferred mechanism of expectation formation according to their relative performance, i. e. their success to predict key macroeconomic variables (*De Grauwe* 2011). In this case, a protracted deviation from inflation target undermines its credibility, agents might shift to adaptive expectations, which in turn aggravates the monetary policy task of boosting output and inflation. This poses the risk for the economy to get stuck in a low-inflation constellation (*Busetti* et al. 2017).

Fortunately, it seems that this risk has not materialised. Inflationary expectations have recovered from their trough in 2015 and are heading now steadily towards a level which is 'below, but close to' the ECB target (Figure 1, above). The threat of de-anchoring has vanished (*Ciccarelli*/*Osbat* 2017). Taking into account the deep structural distortions that came with the US banking crisis and the ensuing euro crisis, it is good news to see also actual inflation on the rise[14] again in major western economies (Figure 5).

Maybe this is bad news for the new Chicago approaches as inflation should have remained *lower* on account of *not* switching to the NF policy of quickly pushing up central bank interest rates, and should be *higher* according to FTPL, given the increased level of government debt in many countries. But in the end there is hope that these unconventional views might fall into oblivion and central banks return to 'business as usual'.

[14] Figures are somewhat more subdued with regard to core inflation. However, the larger the economic area under consideration, the more dubious is the core-inflation concept. Supply-shock events that appear to be exogenous from a small-country point of view turn out to be driven by the overall macroeconomic activity in the world economy.

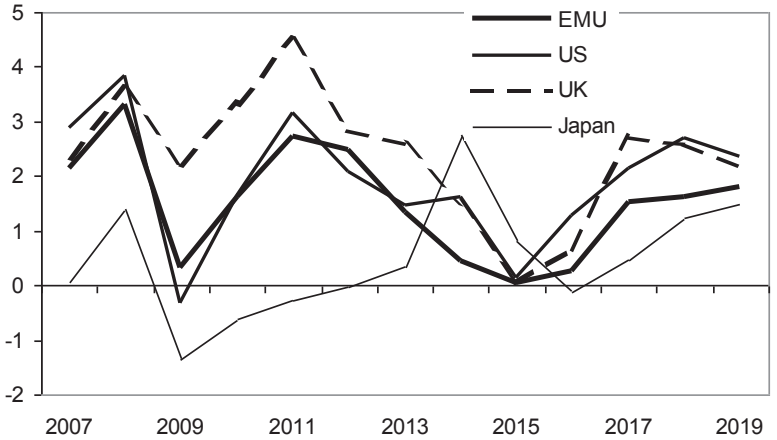

Figure 5: Growth Rate of Consumption Price Index
(Data Source: OECD Economic Outlook, May 2018, online)

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