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The Inter-temporal Price System

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There are relatively few big ideas in economics, not all of which are good ideas. The biggest of the bad ideas is that the state can manage 'aggregate demand' to achieve a beneficial outcome. Among the good ideas are:

1. constrained optimisation; which is the logic of pure choice
2. comparative advantage; which delivers specialisation and mutual gains from trade
3. public choice theory; which examines political motivations
4. entrepreneurship; which is a surrogate for perfect knowledge
5. arbitrage; which drives the (tendency to) the law of one price
6. time-dependent value and production; which is the basis for capital theory
7. interest rates are inter-temporal prices

The last of these receives very little attention. Indeed, it is the big bad idea which has usurped interest rates from their natural microeconomics context, to very bad effect.

Macroeconomic Policy

With microeconomics, the interest rate is presented in the context of investment appraisal, where annuities are capitalised using an appropriate discount rate. In a macroeconomic context, the interest rate is presented as a tool of aggregate demand management.

The full paraphernalia of macroeconomic controls received a much cited indictment from UK Prime Minister James Callaghan at his Party Conference in 1976:

> We used to think that you could spend your way out of recession ... I tell you in all candour that that option no longer exists, and that in so far as it ever did exist, it only worked ... by injecting a bigger dose of inflation into the economy, followed by a higher level of unemployment ...That is the history of the last twenty years.

Thereafter, much of the armoury of Keynesian interventions was set to one side; and the labour historian Peter Clarke observed

> Keynesian policies ... were often displayed as a magic tool-kit which could not only patch up the engine but, with fine-tuning, keep it running at maximum horsepower in a trouble-free way. In the enlightened post war world ... nearly everyone swore by the magic tool-kit. Thereafter, faced with an old fashioned breakdown, they swore at it. (Clark, 1988, p. 313)

Only the interest rate remains in active use: short-term interest rate adjustment is widely regarded as a legitimate means to steer the economy between inflation and unemployment. The schema became formalised as the Taylor Rule (Taylor, 1993).

The Taylor rule

Many features of the Taylor Rule parallel those of the Phillips curve (Phillips,1958): each originated in statistical correlations that caught the imagination of the economics profession; each found its way quickly into the textbooks; each spawned myriad variations upon a statistical theme; and each is devoid of coherent theoretical foundation. Where the Phillips curve bizarrely relates a rate of change (inflation) to a level (unemployment), the Taylor Rule is a hybrid[1] of Classical and Keynesian theory, whereby the natural rate of interest is linked to a measure of Keynesian demand deficiency.

Taylor's original statistical correlates were: (1) short-term rates set by the US Federal Reserve; (2) an index of price inflation; and (3) a macroeconomic measure of capacity under-utilisation. Like Phillips's curve, Taylor's rule afforded great latitude for econometric extemporisation; of which, there has been a great deal.

A recent review of purpose came with the inaugural Martin Feldstein Lecture in 2009, where John Taylor argues that rapid changes in events and policy have made real time evaluation essential: there is a need to address 'new methodological questions about the use of high frequency data and simulation techniques' (Taylor, 2009, p. 1). Internet logs, a 24-hour news cycle and the rapid spread of ideas, imply that real time policy evaluation is here to stay; which is but the latest in a series of developments that have aspired to take macroeconomic policy-making to higher-levels. Yet macroeconomic forecasting remains as inaccurate as it ever was. Lawrence Klein provides a detailed history of the development of forecasting models, over a period of almost forty years (Klein 1984). While the detail of econometric advances is impressive, not a single comment is offered upon improvements in forecasting accuracy. Quite simply, there have been none; but that is a relatively minor problem. By their macroeconomic role in attempting to chart a fine line between inflation and under-capacity, interest rate variations are compromised as inter-temporal price signals.

Inter-temporal Prices

Just as contracts between sellers and buyers determine prices, contracts between lenders and borrowers determine interest rates. An interest rate serves as any other price: it allocates credit, which is scarce. Market prices are the only effective mechanism for reconciling scarce resources against competing (and otherwise excessive) demands, which is why the state has no role in setting prices. Why, then, are monetary authorities tasked to set nominal interest rates; and with what consequences?

To understand the pricing role of interest rates, it is important to recognise that money is not essential to a credit transaction. If (say) ten kilos of a commodity are borrowed with a

contractual agreement that eleven kilos must be repaid after one year, the own interest rate is established as ten per cent per annum. With or without money, interest is best determined by inter-temporal free market trading arrangements.

Given that production takes time, entrepreneurs must anticipate consumers' requirements as best they can. If a commodity is generally expected to become in relatively short supply, the market will show a premium on the 'forward' price; and this gives entrepreneurs the incentive to allocate more resources to the production of that particular commodity.

For wheat and barley respectively, suppose that spot prices are £150 and £100 per tonne and that one-year forward prices are £180 and £90 per tonne. In comparing spot/forward prices, the cost of a delivery of wheat now is the foregone opportunity of waiting one year and having twenty per cent more; but barley is at a one-year discount of ten per cent. The 'inter-temporal price' - for wheat 180/150 (1.20) and for barley 90/100 (0.90) - is a measure of the inter-temporal yield. An investment to produce wheat offers a gain of twenty percent; and an investment to produce barley promises a shortfall of ten percent. Clearly the incentive is for producers to divert resources from barley (increasing its future scarcity and raising its price) to wheat (reducing its future scarcity and lowering its price). By those incentives, there is a natural process of restoring equilibrium; or, rather, a spontaneous process of continuously re-targeting dynamically shifting equilibria across a multitude of markets, trading in diverse commodities.

The inter-temporal equivalent to John Stuart Mill's 'law of one price' is the drive to equalise yields at a common rate (net of default and exchange risk) reflecting the general state of time preference: positive 'time preference' indicates that 'possession' is preferred at an earlier rather than at a later date. Default risk premia offset the possibility that creditors might not be repaid; and premia to offset exchange risks are relevant where debt instruments stipulate repayment in currencies (or commodities) that are expected to fall in value. In an economy unaffected by any monetary disturbance - a hypothetical neutral money economy - the rate charged for bank credit would be determined by the general level of time-preference, plus a default risk premium.

The manner in which inter-temporal prices become aligned with bank lending rates is as follows. Where inter-temporal prices are generally above bank lending rates, entrepreneurs obtain bank credit in order to commit resources to increase the future supplies of commodities (causing prices to fall). The fall continues until commodity yields reach bank lending rates. Entrepreneurial activity - as always - is the equilibrating force. However, this natural tendency is routinely compromised by interventions inspired by Keynesian arguments: that credit markets must serve the objectives of aggregate demand management.

Credit Counterparts of Broad Money

A textbook tautology, the 'credit counterparts of broad money' (CCM) brings some clarity to the confused commentary of many Keynesian presentations[2]. These derive from two tautological structures: the double-entry accountancy of commercial banking; and that relating to the debt instrumentation whereby fiscal deficits are financed.

The credit counterparts truism states that monetary growth must equal: the fiscal deficit *minus* bond sales *plus* commercial bank lending. Thus, for example, a fiscal deficit that is fully

covered by state open market bond sales (which raises interest rates) has no impact on monetary growth. As with any tautology, the CCM reveal nothing about behavioural inter-relationships between (say) interest rates, private-sector demand for credit and investment decisions.

In the context of Keynesian aggregate demand management, fiscal interventions are founded upon the presumptions of underused capacity and a positive income multiplier. These are tantamount to the broader presumption that markets and the price system are ineffective in securing full employment and sustained growth.

Extended experimentation with Keynesian macro-management, during early post-war years, resulted in shifting Phillips curves and stagflation, for which the short-term palliative of 'prices and incomes policy' was applied in a variety of different forms. Trade unions and currency speculators were variously identified as scapegoats for price inflation and currency depreciation. The more general lesson that ought to have been taken is that ever-increasing bond financed fiscal expenditures lead generally to inflation; and, by Hayek's 'interest rate effect', to price distortions and consequential microeconomic dislocation.

Macroeconomic initiatives also took the form of direct intervention in commercial bank lending; that is, by directives limiting the growth of either commercial bank assets or liabilities. Not only are these (1) easily flouted by banking initiatives (for example, disintermediation, off-shore banking and the emergence of parallel institutions) and (2) effective only where foreign exchange is controlled, such impediments are alien to a liberal ethos.

Upon the basis of Milton Friedman's monetarism and impressive displays of close statistical correlations between monetary growth and price inflation, the direct application of money supply growth targets became central to policy initiatives in the early 1980s. Here, the concept of tight control over the money supply was compromised by a number of issues: banking reforms and innovations spawned developments that initially challenged interpretation. Money growth targets eventually gave way to exchange rate targets within Europe as a prelude to the introduction of the euro. There remained only one instrument for the practice of aggregate demand management: variations in short-term interest rates.

By the deliberate setting and re-setting of short-term interest rates for the purpose of aggregate demand management, a monetary authority sets perverse incentives at the microeconomic level: for inappropriate levels of investment and for the wrong kinds of investment which, together, corrupt the supply of goods and services.

Cognac

Consider the production of fine brandy. Cognac can age for seventy years and beyond: the value of cognac rises *pro rata* the time it is stored in oak casks. In addition to the financial capital and cost of secure warehousing, there is the Angels' share. Taking a deep breath in a cognac warehouse is an intoxicating experience.

Suppose that cognac is sold after it has aged 10, 15 and 20 years; that, in supplying cognac to each of these three markets, returns are equalised; that both the angels' share and the costs of warehousing are zero. For a given volume of brandy and discount rate r, returns are equalised where the capitalised value (V_t) of the three options is:

$$V_t = P_{10}(1+r)^{-10} = P_{15}(1+r)^{-15} = P_{20}(1+r)^{-20}$$

where young, middle and old brandy can be priced respectively at P_{10}, P_{15} and P_{20}. In the terminology of the Austrian School, the *structure of production* is in equilibrium if brandy is produced and sold in volumes that are commensurate with equilibrium market prices. Applying (say) a 7 percent discount rate and where 'raw' cognac is valued at £100, those equilibrium prices are £197, £276, and £398 for cognac that has aged for 10 years, 15 years and 20 years respectively:

$$£100 = £197\,(1.07)^{-10} = £276\,(1.07)^{-15} = £398\,(1.07)^{-20}$$

Now if the discount rate falls to 0.06, the equalities are broken

$$£100 < £197\,(1.06)^{-10} < £276\,(1.06)^{-15} < £398\,(1.06)^{-20}$$

setting an incentive to increase the supply of cognac to all markets, causing prices to fall by 10%, 15% and 24% respectively, so that

$$£100 = £179\,(1.06)^{-10} = £240\,(1.06)^{-15} = £321\,(1.06)^{-20}$$

and, (assuming that price reductions are related positively to increased supply), there is a disproportionate increase in the supply of *old* cognac. Alternatively, if the discount rate rises to 0.08, the equalities are again broken

$$£100 > £197\,(1.07)^{-10} > £276\,(1.07)^{-15} > £398\,(1.07)^{-20}$$

setting an incentive to cut the supply of cognac to all markets, causing prices to rise by 9%, 13% and 15% respectively, so that

$$£100 = £216\,(1.06)^{-10} = £317\,(1.06)^{-15} = £466\,(1.06)^{-20}$$

and, (assuming that price rises are related positively to decreased supply), this is achieved by a disproportionate decrease in the supply of *old* cognac. Such changes illustrate a general result: variations in the discount rate have the greatest impact on long-payback (more roundabout) investment projects.

Austrian business cycles

Austrian business cycle theory is driven by: (1) the directional impact upon investment decisions of interest rates that are held down by monetary policy (setting an investment boom); and (2) shortages of consumption goods (and rising prices) that are a direct consequence of the asymmetrical incentive favouring long-payback (more roundabout) investment projects[3]. The former and the latter are respectively referred to as the 'interest rate effect' and the 'relative prices effect'.

The general features of an Austrian business cycle are that easy-credit causes a mismatch between demand patterns and investment plans**,** creating investment structures unaligned with consumers' preferences. With low interest rates**,** investments are too many and

too long (which may force some to be abandoned before completion) and consumption goods are too few (leading to differentially rising prices). Theoretical details were developed by Friedrich Hayek during the 1930s.

In 1928, Hayek had written - 'it is not changes in the value of money which should be at issue, but disturbances of the inter-temporal price system which are without any economic function' (Hayek, 1928) - and Hayek's 1974 Nobel Economics Prize citation describes him as 'one of the few economists who warned about the possibility of the major crisis before the great crash came in the autumn of 1929'.

Mark Twain astutely notes: while history doesn't repeat itself, it sometimes rhymes. Thus, in the 1920s, only a mild recession would have followed growth to 1927, had an easy-money policy not succeeded: 'in prolonging the boom for two years .. [postponing] .. the normal process of liquidation' (Hayek, 1935, p. 162). The Great Depression followed. In the 1970s, Hayek re-examined monetary distortions in the context of labour markets, trade unions and unemployment, being careful to engage a readership that had become well-versed in monetarism and Phillips curves. He then focused upon misallocations of labour and consequential unemployment caused by distortions to the structure of investments. In the 1990s, Information Communication Technology sectors were the primary feature of unwarranted longer-term investments that become viable (but are always unsustainable) during a bank credit upswing. In the vernacular, the dot.com bubble burst. In the 2000s, domestic property developments are the primary feature of unwarranted longer-term investments that were made to appear viable by loose credit.

How it is done

Variations in yields on government debt have special relevance to interest rates generally. The relevance is that, if the state wishes to raise interest rates, debt instruments must be offered to the market at reduced prices, so raising yields to new lenders. In competing for savings, other institutions are then forced to match those higher rates. In reverse, where the state initiates the repurchase of existing debt, bond prices rise and yields fall. Other institutions are then able to arrange their own borrowing requirements at lower rates. By such actions - which alter the composition of the national debt in terms of currency and interest-bearing securities - the state manipulates interest rates. Typically, this technique is applied at the short end of the market. Less frequently, it is applied at the long end, with dealing in gilts, when it has become known as 'quantitative easing'.

Quantitative easing

In the aftermath of the credit crunch, with short-term interest rates close to zero, quantitative easing was viewed as an additional macroeconomic tool. Chastened by their experience of defaulting borrowers, commercial banks had raised their lending standards. In a move to counter that tendency, the Bank of England bought government (and corporate) bonds from commercial banks. By that boost to their liquidity, the rationale was that commercial banks would be more inclined to extend business loans. The oversight was that commercial banks were not lending because they did not see credit-worthy customers.

The Royal Bank of Scotland is 84 percent state owned. In November 2009, RBS announced is failure to meet the £16 billion business lending target set by the state, because of 'subdued demand' from consumers. In response, the UK Treasury demanded that RBS publish

a ‘consumer charter’ to show that lending terms and conditions were not too harsh**.** Bankers were reckless; now they were not reckless enough!

In raising bond prices and lowering long-term yields, quantitative easing compromised the solvency of UK pension funds. The fall in long-term rates raised the actuarial value of pension liabilities; the consequential shortfall in asset values forced the closure of many final-salary schemes. By its impact on long-term interest rates, quantitative easing is another tool by which inter-temporal prices have been compromised by efforts to give effect to macroeconomic management.

Conclusion

Keynes believed that the efficient allocation of resources by the relative price adjustments of market systems is compatible with the macroeconomic engineering of aggregated demand; and he ended his *General Theory* with the following remark:

> The authoritarian state systems of today seem to solve the problem of unemployment at the expense of efficiency and freedom ... But it may be possible by a right analysis of the problem to cure the disease whilst preserving efficiency and freedom (Keynes, 1936, p. 381)

The Keynesian experiment was bold and its influence is enduring: its legacy is high taxation, hoards of state-sector employees, incursions upon individual freedoms and recurrent business recessions induced by meddling with interest rates. Yet, hope breeds eternal, and there remain two kinds of economists: those who believe (as did Keynes) that state interventions are necessary to constrain an inherently flawed capitalist system; and those who believe resources are best allocated by a system of free-market prices. The determination of interest rates is central to that ideological dispute. The argument of this paper reaches a conclusion that draws from a observation made by Winston Churchill: ‘It has been said that democracy is the worst form of government, except all the others that have been tried’[4]. The parallel assertion is: ‘It has been said that market pricing is the worst economic system, except all the others that have been tried’; and this must include the system of market inter-temporal pricing.

Appendix

Credit Counterparts of Money

A familiar derivation of CCM integrates all debt options for the state with the definition of broad money (M). New government debt is one of two categories of total domestic bank credit expansion (DCE): bank credit obtained by the government (DCE^{G}) and by non-government (DCE^{NG}) agencies:

$$DCE \equiv DCE^{G} + DCE^{NG} \quad (1)$$

Government borrowing (GBR) is necessary to accommodate:

(i) a fiscal deficit, the excess of expenditure (G) over revenue from taxation (T), with new debt taking the form of currency (ΔC) and bonds (ΔB) acquired and held as assets by banks ($\Delta C^{B} + \Delta B^{B} \equiv DCE^{G}$) and non-banks ($\Delta C^{NB} + \Delta B^{NB}$);

(ii) the acquisition of foreign exchange reserves (ΔR).

These give

$$GBR \equiv (G - T) + \Delta R \equiv \Delta C^{B} + \Delta B^{B} + \Delta C^{NB} + \Delta B^{NB} \quad (2)$$

$$DCE^{G} \equiv (G - T) + \Delta R - \Delta C^{NB} - \Delta B^{NB} \equiv \Delta C^{B} + \Delta B^{B} \quad (3)$$

Broad money (M) comprises non-bank holdings of currency (C^{NB}) and bank deposits (D^{PTS})

$$M \equiv C^{NB} + D^{PTS} \quad (4)$$

The value of banks deposits (D^{PTS}) is identical to the total value of bank assets; *i.e.*, currency (C^{B}), bonds (B^{B}) and non-government debt

$$M \equiv C^{NB} + (C^{B} + B^{B} + \text{non-government debt}) \quad (5)$$

Changes in levels are indicated conventionally as:

$$\Delta M \equiv \Delta C^{NB} + \Delta C^{B} + \Delta B^{B} + DCE^{NG} \quad (6)$$

Substitution in (6) from (3):

$$\Delta M \equiv (G - T) - \Delta B^{NB} + DCE^{NG} + \Delta R \quad (7)$$

identifies the credit counterparts of broad money:

ΔM	$G - T$	ΔB^{NB}	DCE^{NG}	ΔR
Monetary policy	Fiscal policy	Interest rate policy	Credit policy	Exchange rate policy

Equation (7) reformulates the tautology of equation (1). So, while it offers nothing more than the basis for story-telling (theory), its all-encompassing structure imposes a conceptual constraint upon policy story-telling.

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[1] By the structure of the Taylor Rule, the target inflation rate features alongside the equilibrium (natural) rate of interest (a corollary of the classical natural rate of unemployment) and the Keynesian concept of capacity under-utilisation. Applying the Taylor Rule to optimal effect requires an inflation target that is compatible with the natural rate of interest and an aggregate output 'gap' that is compatible with the natural rate of unemployment.

[2] See the Appendix. Its relevance was first officially acknowledged by the then Chancellor (Roy Jenkins) in his Budget statement of 1969.

[3] Where investment has been switched from short to long roundabout methods, the supply of final goods is affected. A smaller volume of final goods per period (over a longer period) is substituted for a larger volume of final goods per period (over a shorter period). Together this reduced supply drives up the prices of final goods (which is the 'relative prices effect').

[4] Speech in the House of Commons,11th November 1947