

# Capital structure and the business cycle

Pierre le Roux

First published in **1999** by **The Free Market Foundation**  
PO Box 785121, Sandton 2146, South Africa

Telephone: (011) 884 0270  
Fax: (011) 884 5672  
Email: [fmf@lia.co.za](mailto:fmf@lia.co.za)

© The Free Market Foundation 1999

FMF Monograph No. 23

All rights reserved

ISBN: 1-874930-31-7

# Contents

## **Foreword**

## **The author**

## **1 Introduction**

## **2 Capital and the business cycle**

The theory's elements

Prices are signals

Interest rates facilitate intertemporal coordination

Money can masquerade as savings

Capital and intertemporal complementarity

Substitution between higher-order and lower-order capital goods

The demand for final output and the demand for factors of production  
will not necessarily change in the same direction

Two kinds of knowledge exist

Business cycle theory

Some testable propositions

Some policy implications

## **3 Rival theories and their neglect of capital theory**

Keynesianism

Monetarism

New Classicism

Conclusions

## **4 Support for the Austrian theory from South African data**

The South African business cycle: 1980-1996

Data and methodology

Causality test of Propositions 1 to 3

Propositions 4 to 9: The dynamics of the business cycle

## **5 Conclusions**

## **Bibliography**

## Foreword

The purpose of FMF *Monographs* is to use the analytic method of political economy to shed light on how best the promotion of free markets will improve the workings of the South African economy. In particular, authors are urged to apply the microeconomic approach of studying how individuals, firms and households behave in response to either naturally occurring or regulatory induced incentives. This requires that they display a sound institutional knowledge and understanding of their theme. It also implies that authors pursue their analysis in a logical fashion to policy proposals, unencumbered by preoccupation as to what is or is not politically acceptable at any given time.

This “micro” instruction is particularly difficult to follow when the market under scrutiny is one of the four ‘macro’ markets of labour, goods, bonds or in this case, money. The very subject matter in such markets is aggregated by definition. And when economists study these markets they tend not to consider the micro-implications.

In the case of money this is particularly so. Before World War I Irving Fisher (1911, p 155) had already spelt out the monetary identity that

$$M_s V \equiv PQ \equiv \text{GNP}$$

where  $M_s$  is quantity of money,  $V$  its velocity of circulation,  $P$  the average price level, and  $Q$  the volume of transactions at that price. Assumed transaction homogeneity and price averages remove much meaning from this truism. In addition Fisher regarded “money as a veil” whose increases or decreases could not affect either the volume of trade or the velocity of circulation. In short, the average price level and its rate of change (inflation or deflation) was linked directly to  $M_s$ .

This early quantity theory was quickly questioned in most economies when national accounting became more precise and it was observed that (except in conditions of severe inflation) money supply could increase over a multi-year period, at a rate well in excess of the inflation rate. In short  $V$ , velocity, the speed with which money changes hands (a variant of money *demand*, not supply) is volatile. Similarly  $Q$ , real GNP is not static.

Money, therefore, ceased to be regarded a matter of policy importance. Early Keynesians<sup>1</sup> did not dispute the identity  $PQ = \text{GNP}$  but added to it the Keynesian components of aggregate demand thus:

$$C + I + G \equiv PQ \equiv \text{GNP}$$

where  $C$  = final expenditure, and  $I$  and  $G$  are investment and government expenditures respectively. To maintain aggregate effective demand or GNP in the face of weak investment, all that was required was an increase in government expenditures (le Roux, p 17 notes how such weak investment is “inexplicable” in Keynesianism). What  $M_s$  was, was irrelevant, since  $V$  was a will o’ the wisp which would adjust to accommodate any deficiency or surplus thus holding  $M_s V \equiv \text{GNP}$  at what  $C + I + G$  said it should be. “Idle balances” of money would simply rise or fall to hold the algebraic identities equivalent. And since wages and prices were “sticky” or fixed, holding the GNP level meant holding steady the value (real GNP) of  $Q$ .

So economists swung from a situation where money was seen as important for its impact on prices, but not on real economic activity, to one where money was seen as irrelevant, since price level changes were unlikely. The demand for money was ignored in the first and was regarded as accommodating in the second.

The two schools of thought moved very close together in the quarter of a century after 1960. Monetarists, realising that money demand is also important, had to struggle to define both  $M_s$  and

V. It is, of course, easier to capture  $M_s$  in the published statistics, and hope that  $V$  will be constant for a sufficiently long period to permit use of  $M_s$  alone as an instrument to control  $P$ . Unfortunately, Goodhardt's Law<sup>2</sup> took over, and governments found themselves using a plethora of measures of  $M_s$  ( $M_1$ ,  $M_2$ ,  $M_3$  etc.) none of which operated directly on  $P$  for any meaningful period.

Keynesians similarly came to realise that money did impact on price levels, not just on  $Q$ . And the consequence was a lengthy period of reliance on the Phillips curve trade-off using monetarily-induced inflation or deflation as a policy variable.

As le Roux (p 20-21) indicates, that trade-off – namely the presumed inverse relationship between inflation and unemployment was found to be only valid in the short run. As soon as workers anticipate inflation (get “wise” to government policy) they realise that higher money wage offers are not so attractive after all. They require still higher wages to accept a job and get off the list of the unemployed. Indeed the long Phillips Curve is vertical at the so-called NAIRU (non-accelerating inflation rate of unemployment). As a consequence much policy today is directed at discovering the NAIRU (or “output-gap”) and nudging inflation down without creating higher unemployment in the short-term.

The consequence is that reducing inflation is not regarded as crucial, but only “nice-to-have”, and the impact of money (not least because of Goodhardt's Law) is also not perceived to be fundamental. Another reason for the perception of the relative unimportance of money is that the monetarists themselves (using the algebraic identity  $M_s V = PQ$ ) saw increases in money being injected into the economy “as though from a helicopter”. In short they ignored the fact that it impacts on “the structure of production” (le Roux, p 21) at different orders of goods (closer to or further from the final consumer) and in different segments of the economy.

FA Hayek (1977, pp 330-3) argued that inflation could only temporarily reduce unemployment. Like Friedman's view of the expectations – adjusted Phillips Curve, Hayek's explanation is also based on the fact that transactors only have imperfect information. The allocation of resources in an economy is a complex task. It is inevitable that mistakes will be made, whether the economy is controlled by the market or a command mechanism. Either individual businessmen or the central planner could fail to perceive consumers' wants correctly. Information costs, however, are much lower in the exchange economy because individual entrepreneurs need only concern themselves with those data relevant to the particular markets in which they are operating. In a centrally planned economy, all information must be collected and collated and analysed simultaneously in one place. In either situation mistakes will be made.

For example, labour can be drawn into jobs where there is insufficient demand for the final product to pay wages. In a decentralised economy this normally becomes quickly apparent. Firms which overestimated the demand for their product will fail and the workers employed there will seek out better (consumer supported) jobs.

However, during unanticipated inflation, even firms making products for which there is insufficient demand will prosper. This is because employers are able to hire workers at a given wage rate which is low compared to the price of the final product when it is eventually sold. Indeed, both worker and employer are probably unaware that the wage rate agreed on is low in comparison with what the price of the final product will become.

This argument only holds if the inflation is unanticipated. Transactors can adjust their behaviour to the market's real needs if the inflation is anticipated. As a corollary, only a continuously accelerating rate of inflation can indefinitely postpone the inevitable unemployment (the stagflation) which will emerge when the misdirected labour begins to look for jobs that can be supported by the actual pattern of demands.

This of course begs the question. Why? Although changes are continually taking place in the economy – some industries are growing, some declining – why should there ever be a *general* boom or slump? The only phenomenon which permeates the whole economy is money. Why should rises or falls in the demand for or supply of money generate the business cycle?

Why is there suddenly a '*cluster*' of business errors? Second, why do capital goods industries fluctuate more widely than consumer goods ones? Third, why does the quantity of money rise in a boom and fall in a slump?

In Chapter 2, le Roux explains the neglected Austrian theory of capital and the business cycle which both Keynesians and monetarists have ignored. Le Roux argues that the business cycle is generated by monetary expansion and contraction. People have a *time preference*. The less consumption they prefer now, the lower their time preference. The proportion of income devoted to saving and investment will be higher and the capital stock of the economy will be built up, lengthening the production process. Higher time preferences have the reverse effect. The final market rate of interest reflects this.

When new money is printed it appears as if the supply of savings has increased (see p 6). Interest rates fall and businessmen are misled into borrowing additional funds to finance extra investment activity. This investment occurs first in capital goods industries rather than consumer goods ones. The 'process of production' is lengthened. This would be of no consequence if it had been the outcome of a genuine fall in time preferences – it could be sustained indefinitely – but the change was government induced. The new money reaches factor owners in the form of wages, rent and interest. Given unchanged time preferences, the factor owners will then spend the higher money incomes in their existing consumption: investment proportions. That is, demand will move back from the higher orders to the lower orders of production (to industries closer to the final consumer). Capital goods industries will find their expansion has been in error and mal-investments have been incurred. Losses will be made due to entrepreneurial misjudgements and the mal-investments must somehow be liquidated. In short, 'booms' of this type are wasteful misinvestment due to government interference with the marketplace. The 'crisis' occurs when consumers attempt to re-establish their desired consumption-income proportions. The ensuing 'depression' follows as night follows day. It is simply the process of adjustment which the economy makes to correct the errors and the wastes of the boom.

Depression is the necessary and inevitable 'recovery' process of a government induced boom. Just as booms are marked by falls in the rate of interest, so they are characterised by a bidding-up of the prices of industrial goods relative to those of consumer goods and of commodity prices relative to those of industrial goods. So depressions see a fall in all prices with those furthest from the consumer falling fastest. As factors shift back to the lower orders of production some natural unemployment will occur. This will disappear provided real wage rates are not artificially high.

An increase in the money supply is, therefore, not 'neutral'. Everyone's cash balance does not increase uniformly as though money had been scattered evenly over the country. In the long run it is so, but only after the completion of the market process. Austrians maintain that study of this process is essential, not just the equilibria which may exist at the beginning and end of the monetary injection. It is the *process* which explains the mal-investments which in turn explain the cycle. As Barry (1981, p 23) points out this is why sectoral unemployment may occur even if governments followed Friedman's rule of a slow but steady rate of monetary expansion. In brief, Austrians (such as le Roux) do not disagree with monetarists that inflation is a monetary phenomenon – but because of their emphasis on the microfoundations of sectoral differences in the impact of money on the economy they view it as an even more potent factor.

Thus we conclude with the observation we began with. Unemployment can only be persistently kept below some 'natural' level by an impossibly ever-accelerating inflation rate. The view of 'rational expectations' theorists (see pp 21-2) that people will come to anticipate that inflation in advance can, of course, be reconciled with the notion of the neutrality of money expansion. For this to be valid empirically, however, the point of injection of the ever increasing additional money into the economy must always be the same *and* both the route and the rate whereby it passes through the economy must be identical on each occasion. Given changing individual tastes and technologies Austrians find this view unacceptable. Rising prices would always change in their *relative* relationships.

The unique attribute of this *Monograph* is that le Roux does not stop here. Unlike most Austrian economists he puts his propositions to the empirical test. For example, he uses South African Reserve Bank data on the supply of bank credit in the economy (a measure of  $M_S$ ) and finds it independent of the supply of savings (as predicted by Austrian theory). Similarly, he proceeds, proposition by proposition (pp 29-45) to show that credit growth does not impact uniformly across the economy. The relative prices of producer and consumer goods (higher and lower order) change as credit rises or falls – in accordance with Austrian theory. Furthermore, these relative ratios, in turn, vary with the sector under examination.

Le Roux's *Monograph* is not an easy read. But the subject matter is not easy (contrary to what one might expect from self-assured commentators on macroeconomic issues in the popular press and broadcast media). It is, however, a *Monograph* of some importance. The FMF, its members, Directors and staff do not necessarily agree with the theory the author proposes, nor his inferences. Nonetheless it is believed that this *Monograph* and its approach will repay careful reading by ordinary citizens and policymakers alike.

**W. Duncan Reekie**

Bradlow Professor

University of the Witwatersrand

Publications Editor, FMF

## References

Barry NP, (1981) 'Austrian Economists on Money and Society', *National Westminster Quarterly Bank Review*.

Fisher I, (1911) *The Purchasing Power of Money*, Macmillan.

Grant, R, (1999) *Real Money*, Free Market Foundation.

Hayek FA, (1977) *The Constitution of Liberty*, Routledge, Kegan and Paul.

Robertson, DH, (1967) *Lectures in Economic Principles*, Fontana.

<sup>1</sup> Keynes himself did not go as far with these arguments as did his disciples. See Robertson, (1967, p 388).

<sup>2</sup> Goodhardt's Law is named after the Bank of England's Charles Goodhardt who asserted that as soon as one monetary measure is chosen for targeting by the authorities, individuals change their behaviour and the measure becomes redundant.

## The author

Pierre le Roux is a senior lecturer in economics at Vista University in Port Elizabeth, previously senior lecturer at the University of Port Elizabeth, 1983-1991. He was educated at the Universities of Potchefstroom, Free State and Vista. His specialisation in managerial and microeconomics led to his great adherence to the Austrian approach to the business cycle. This approach is embodied in the commercial forecasting of demand which he carries out for several major companies. Currently he also lectures managerial economics in the distance learning MBA programme of the University of Wales, as well as operations research for the Production Management Institute of South Africa.



# 1

## Introduction

Capital theory provides a logical foundation for macroeconomics as it captures the universals of both time and money. It also allows for the forces of entrepreneurship in shaping the structure of production and bringing about a spontaneous order.

This *Monograph* firstly provides a theoretical capital base for the business cycle. In doing so, the works of the Austrian school of thought are largely drawn upon. The works of Knut Wicksell on the relationship between the natural and market rates of interest, as well as the insights of David Ricardo and John Stuart Mill are also used in support of the arguments which are developed.

Secondly, competing contemporary theories of the business cycle are addressed and the extent to which capital theory is utilised is investigated. Neglect of capital theory has tended to place these contemporary theories at the extreme positions in terms of money and time.

Lastly, deductive reasoning is employed to investigate the effects of stabilisation measures undertaken by government allegedly to smooth and to prevent severe business fluctuations. This is done in the light of the theory of the business cycle developed earlier.

Business cycles are not to be seen as continuous rhythmic movements in macroeconomic magnitudes. Rather, they should be viewed as consisting of an upswing followed by a downswing. Casual inspection of statistical data such as total output, employment and net investments suggests a lack of cyclical regularity. Attempts to identify rhythmic movements in economic activity such as the Kondratieff long wave and Juglar and Kitchin waves tend to be nothing more than creative empiricism with doubtful theoretical grounds for their existence.<sup>1</sup>

Austrian theory, conversely, concentrates on economy-wide disturbances which occur from time to time. These disturbances are heterogeneous because there are no built-in econo-rhythms in the market process. They are also, however, homogeneous in the sense that they are caused by the disruption of intertemporal markets.

<sup>1</sup> Kondratieff Long Waves are cycles lasting in the vicinity of 50 years while Juglar and Kitchin waves are in the vicinity of 8 years.

# 2

## Capital and the business cycle

There are a number of modern expositions of the Austrian theory of the business cycle in the literature which, for the most part, are complementary (Rothbard 1972; O'Driscoll & Shenoy 1976; Wainhouse 1984; Gunning 1985; Garrison 1986b), but there are no canonical versions. These modern expositions all build on the works of Hayek and Mises who maintained that monetary changes cause the business cycle. However, it is successive changes in the real structure of production which constitute the business cycle.

The theory is not primarily about depressions, but rather about artificial booms and the market process which brings them to an end. The depth and the length of the ensuing depressions depend on the misallocations caused during the artificial boom. These misallocations are due to malinvestment based on the falsification of interest rates.

Leijonhufvud (1984: 179-205) categorises competing theories about macromaladies in terms of:

- 1 the nature of the disturbance; and
- 2 the nature of the failure of the economy to adjust.

The two are further categorised as *n* for nominal and *r* for real. Leijonhufvud recognises that it is possible for either to be partly nominal and partly real.

The Austrian theory falls in both categories. Monetary factors cause the initial upturn (*n*) but, due to a temporary disruption of intertemporal market mechanisms, they also change the pattern of resource allocation (*r*) (Machlup 1976: 23). This theory also has both an endogenous and an exogenous component. The upturn is exogenous in that an economywide disturbance is inflicted on the market process. The downturn is endogenous due to the adaptation to the changing structure of production (Garrison 1989: 7).

The empirical evidence in support of the theory is often neglected because proponents of the Austrian school tend not to believe in quantitative evidence generated by current statistical techniques, even when such evidence may actually be sympathetic to the theory (Bordo 1986: 455). This is due to the rejection by many Austrians of positivism in which "history, stripped of all nonquantifiable elements, unilaterally tests theory" (Garrison 1986b: 449). This stance is a reaction to those economists who allow statistical research to dictate their theories, neglecting deductive reasoning in this process.

Some universal propositions can, however, be found to test the general validity of the Austrian theory. There is no presumption as to why the theory cannot be confirmed or refuted by the same testing procedures as those used to test Keynesian, Monetarist and New Classical hypotheses. Although this approach is very un-Austrian in terms of subjectivism and methodological individualism, the belief is that a greater appreciation of the theory can be created in this way. Such appreciation can have sobering effects on both mainstream theory and economic policy practices. Some comfort is found in the simple reminder of White that: "Important as methodology is for the validation of an approach, surely the flourishing, or otherwise, of the Austrian research programme depends on whether it generates interesting 'conjectures and refutations'" (1992: 258).

### The theory's elements

Austrian business cycle theory draws from price, capital and monetary theories. A high degree of complementarity exists among the individual elements.

Garrison (1986b: 439-442) identifies seven such individual elements and establishes the significance of each for the composite theory. These are:

- 1 Prices are signals;
- 2 interest rates facilitate intertemporal coordination;
- 3 money can masquerade as savings;
- 4 capital is characterised by intertemporal complementarity;
- 5 substitution takes place between higher-order and lower-order capital goods;
- 6 the demand for final output and the demand for the factors of production do not always move in the same direction; and
- 7 two kinds of knowledge exist.

To reject any of the above elements is to threaten the logical consistency of the theory.

### **Prices are signals**

Prices are essential for conveying information on changing valuations and relative scarcities of alternative resources. They provide a basis for economic coordination and a spontaneous order. As Sowell (1980: 80) points out: "Prices are important not because money is considered paramount but because prices are fast and effective conveyors of information through a vast society in which fragmented knowledge must be coordinated".

Entrepreneurs in society rely on the clues supplied by prices in order to make choices about how to allocate resources among competing ends. These prices are themselves the result of independent decisions being made simultaneously by other entrepreneurs. Crucial decisions are made throughout the economy on how to combine resources effectively. These decisions are keyed to the observed changes in relative prices and are made on the basis of the knowledge conveyed by the changing prices. Prices carry only as much information as has been imparted to them by the outcome of the rivalry taking place among competing individuals.

Prices perform three different information roles, namely, they may make it possible for individuals to make decisions thinking they possess much more knowledge than they really do (Hayek 1945), they serve as devices from which individuals can infer knowledge (Grossman 1989), and when in disequilibrium, prices provide profit opportunities (Kirzner 1984; Thomsen 1992: 61; Van Zijp 1993: 89).

Prices are not equilibrium prices. It is the actions of entrepreneurs in the exploitation of the profit opportunities provided by disequilibrium which bring about a spontaneous order and the integration of the structure of production.

Price changes do not come clearly marked 'nominal' or 'real', and the difference between a 'nominal' price and a 'real' price is more than a simple adjustment for expected changes in the price level. 'Real' prices are prices which are consistent with the underlying real factors of the economy (the structure of production). This distinction allows for the 'injection' effects of new money (Garrison 1986b: 439). Market participants depend on nominal prices to tell them what the real factors are.

When price signals are falsified, entrepreneurs act in ways which make for economic dis-coordination. This can lead to permanent changes in the structure of production, depending on the permanence of such falsifications, i.e. a subsidy or a tax. If such falsifications are temporary, the changes will be temporary and so will be the dis-coordination caused by them. Monetary manipulation creates a basis for this type of economic dis-coordination.

### **Interest rates facilitate intertemporal coordination**

Austrian economists emphasise that interest rates serve to coordinate saving and investment decisions. It is an intertemporal price which allows the preferred time pattern of consumption to be translated into a corresponding time pattern of investment activity. It clears the market for 'loanable funds' and not the demand and supply of money as held by the 'liquidity-preference' view (Van Zijp 1993: 97).

Interest rates reflect the opportunity costs of investment projects. "There is never a lack of investment opportunities. There are always unlimited investment opportunities; it is only investment

funds which are limited. And it is the interest rate – the opportunity cost – which keeps business from doing every project imaginable” (Skousen 1990: 234).

### **Money can masquerade as savings**

Money drives a wedge between saving and investment and falsifies the interest rate. This creates the impression that savings have increased. This dis-coordinates the time pattern of investment and consumption. The result of this intertemporal dis-coordination is revealed in malinvestment. Malinvestment is not only revealed by overinvestment but also by underinvestment. Estey’s, and Valentine and Ellis’s reference to Hayek’s exposition of the business cycle as a ‘theory of overinvestment’ is a confusion of the theory (Estey 1956: 212; Valentine & Ellis 1991: 357).

In its commodity form, the supply of money tends to be fairly inelastic and exogenous depending on the discovery of new sources of the commodity which serve as money. Increases in the supply of loanable funds are almost entirely dependent on increases in savings. The supply of fiat money is, however, far more elastic and makes monetary expansion possible through the credit markets. Increases in loanable funds are thus made possible through the extension of credit and not through increases in savings (Skousen 1990: 265-286).

### **Capital and intertemporal complementarity**

Capital goods are heterogeneous in use and are related to one another by various degrees of substitutability and complementarity. Substitutability is the phenomenon of change since it allows for the substitution of capital goods through the structure of production. Complementarity puts a constraint on the extent of the change since various capital goods can only be employed at specific stages of production (O’Driscoll & Rizzo 1985: 160-187).

Artificially low interest rates initially result in overinvestment in higher-order capital goods and underinvestment in lower-order capital goods. This process ends when the scarcities of complementary lower-order capital goods are revealed (Lachmann 1978: 117-118). “Capital goods which do not fit into any capital combination, presently existing or expected to come into being in the future, lose their capital quality and turn into a kind of scrap” (Lachmann 1986: 63). The investments induced by an artificial lowering of interest rates come to an end because of the lack of complementary capital goods. This is one important reason why an economic upswing cannot go on indefinitely.

### **Substitution between higher-order and lower-order capital goods**

A fall in the rate of interest favours investment in higher-order capital goods since the earlier stages of production are more heavily time-discounted than the later stages (Steele 1992: 479). This leads to a substitution of lower-order capital goods for higher-order capital goods.<sup>1</sup>

The subsequent ‘scramble’ for the complementary lower-order capital goods causes their prices to increase. This increases the demand for loanable funds and drives the interest rate up. Further investment in higher-order capital goods is discouraged and it may even lead to the liquidation of some partially completed projects (Garrison 1986b: 441).

The Austrian school also maintains that there is substitution of labour between the stages of production. No distinction is drawn between cyclical and structural unemployment. All unemployment is structural since distortions of interest rates change both capital structure and the structure of employment. A decrease of the interest rate increases employment (initially) in the higher stages of production and decreases employment in the lower stages of production.

### **The demand for final output and the demand for factors of production will not necessarily change in the same direction**

This element seems to be the complete opposite of virtually all other modern macroeconomic theories. In modern macroeconomic theory an increase or decrease in the level of consumption or final demand leads to an increase or decrease in the demand for the factors of production.

A reduction in final demand can, nevertheless, be due to a decrease in time preference with a corresponding increase in savings. This lowers the rate of interest and results in a shift of resources away from the production for current-period consumption (lower-order) towards the production for future-period consumption (higher-order). There is thus a permanent lengthening of the structure of production and an increase in economic growth (Skousen 1992: 98-99).

There may even be a net increase in the current demand for capital and labour. This may explain why countries with high saving rates, such as West Germany, Japan, and many Far Eastern ones, have had some of the highest rates of capital formation and economic growth (Modigliani 1986: 303; McConnel & Brue 1987: 446).

### **Two kinds of knowledge exist**

It seems that entrepreneurs never learn to anticipate that falsified low interest rates will eventually increase again. They seem to be very myopic when it comes to distortions caused by the interest rate.

Hayek's distinction between two kinds of knowledge helps to take account of the knowledge problem (Hayek 1945: 519-530; Garrison 1986b: 442). Hayek distinguishes between specific or subjective knowledge, which is knowledge of the particular circumstances of time and place (normal market information coupled with entrepreneurial insights), and scientific or objective knowledge which is knowledge of the structure of production (Van Zijp 1993: 218). Entrepreneurs can be induced by market prices to behave as if they understand the structure of production. They cannot be expected to correct this knowledge of price distortions caused by monetary injections.

In Figure 1, these two kinds of knowledge are illustrated by means of a Venn-diagram. Economists have knowledge of the structure of production and some knowledge of markets. Business people have knowledge of the market and some knowledge of the structure. The size of the overlap represents the common knowledge which makes a science of economics possible (Garrison 1986b: 444).

The size of the overlap is positively related to the extent of government intervention. With increasing intervention, market participants find it more worth their while to learn how the market process works and how government policies affect it, and economists find it increasingly necessary to understand the particulars of the markets which are being affected by the intervention of government.

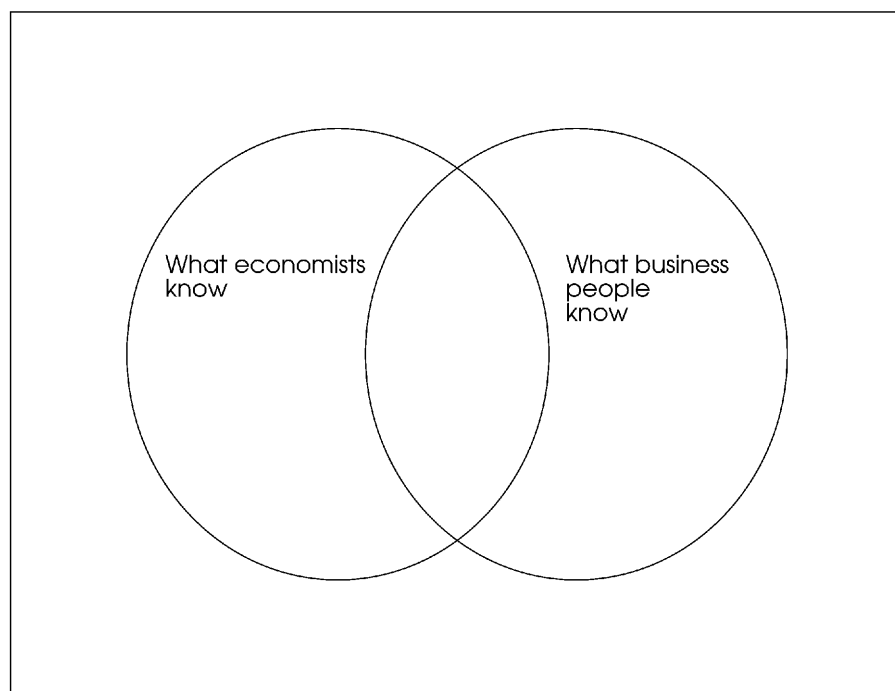
New Classicism, conversely, denies that market participants lack a detailed knowledge of the structure of the economy. The overlap in Figure 6.1 encompasses the knowledge of economists. They behave as if they actually know the structure of the economy and no intertemporal discoordination will occur from falsified interest rates (Lucas 1981; Butos 1985).

### **Business cycle theory**

While there is no canonical version of the Austrian theory of the business cycle, and although its popularity dwindled in the wake of the General Theory, there has recently been a resurgence with the discovery of 'old principles' by mainstream economists (Mankiw 1990; Cochran & Glahe 1994). Austrians such as Wood (1984) and Steele (1992) use modern financial techniques to elucidate the detailed linkage between monetary manipulation and the specific pattern of malinvestment made by firms of different types. Others attempt to modernise and rectify some of its alleged shortcomings (Egger 1986: 56-69). These modern expositions still use the capital structure as the base. Expectations, coordination and capital allocation are still the analytical building blocks.

We now attempt to integrate these modern views and modifications to accommodate criticism. Begin with a situation of equilibrium in terms of plan compatibility in the economy. This implies that the market rate of interest reflects the time preference of savers and investors. Perfect coordination between the various stages of production exists.

FIGURE 1: TWO KINDS OF KNOWLEDGE



Source: Garrison, 1986, 445

To start from a situation of equilibrium has many advantages. Firstly, the purpose of theory is to explain why and how things can go wrong. It can therefore not start from a situation of unused or idle resources where things are already going wrong. The existence of such resources has to be explained. Secondly, the situation of equilibrium is already well explained by the general body of economics and lastly, more attention is paid to the causes of change in the structure of production.

A monetary expansion through the credit markets depresses the market rate of interest below the natural rate. The new money drives a wedge between savings and investments. The economy is no longer in equilibrium. The cost of borrowing funds falls.

This fall in the market interest rate relative to the natural rate increases yields across all stages of production, but it has the greatest impact at the stage which is most heavily time-discounted. The value of investment projects does therefore not increase uniformly. The value of projects yielding consumption output in the more distant future (higher-order capital goods) rises relative to projects with more immediate payoffs (lower-order capital goods).

The boom results from three effects namely, a discount effect, a cost effect, and a derived-demand effect ( O'Driscoll & Rizzo 1985: 205-206; Van Zijp 1993: 99). The discount effect arises because investors use the market rate of interest as a discount rate in the computation of the present value of investment projects. The cost effect follows from the fact that the market rate of interest is also the price to be paid for loans. The derived-demand effect makes investment in some capital goods more profitable, while at the same time it reduces the profitability of investment in other capital goods.

The monetary expansion is misinterpreted as an increase in the propensity to save. Credit masquerades as savings and results in resources being bid away from the lower-order capital goods industries towards the higher-order capital goods industries. Capital structure is lengthened as production becomes more capital intensive.

This movement of resources results in a reduction in the production of consumer goods. Income recipients are unable to acquire the consumer goods they wish to purchase because a smaller portion of consumer goods is being produced at the very time that their incomes are bid up. Consumers are compelled to consume less (forced to save) than planned for.

Re-allocation of capital goods and complementary factors of production towards the earlier stages of production occurs, but in a manner inconsistent with time preferences and opportunities.

Future-period consumption goods are being provided at an increasing rate. Yet, this future output cannot be used now to satisfy the increasing demand for present consumption goods as half-completed projects cannot produce goods which can be consumed.

The increased demand for present consumption goods signals the onset of the crisis. The increased profit margins on consumption goods need not be accompanied by higher interest rates. As more investments are made in shorter processes, demand for inputs in these processes intensifies, while at the same time demand for inputs in longer processes declines. Layoffs and idle capacity develop in these industries. Hayek calls this response by entrepreneurs to changing profit margins the 'Ricardo effect' (Steele 1996: 25). The prices of consumer goods increase relative to that of future goods. Returns in consumer goods industries begin to rise. Entrepreneurs begin to bid resources away from the capital goods industries (non-specific resources), rendering some of the projects unprofitable. Unemployment and resource idleness result in the earlier stages.

It is more likely, however, that interest rates will play a significant role. The monetary authorities may respond to resource idleness developing, by accelerating the rate of growth of credit money to prevent unemployment and resource idleness thus maintaining the growth in the earlier stages.

The upper turning point occurs with a credit crunch, with a comparatively sudden and simultaneous financial crisis for many firms (a cluster of errors). Entrepreneurs in the earlier stages are simply not able to command the complementary factors necessary to complete newly undertaken projects. Labour and raw materials are prohibitively expensive for entrepreneurs to purchase at increased interest rates. The initial round of unemployment and cyclical decline begins as these factors are released.

The depth and length of the ensuing depression depend on the time taken to correct the investment errors of the past and the completion of the adjustments to the existing real conditions. The Keynesian analysis begins at this point of resource idleness when the marginal efficiency of capital declines. The monetarists again would emphasise the overall shortage of money.

For Austrians, however, the time to prevent the coming of a depression is during a boom. For Hayek, the depression caused by an induced deflation can be prevented in principle by appropriate monetary countermeasures but he remains sceptical. "The difficult question, which I can mention only briefly here, is how this could be done without producing further misdirections of labor" (Hayek 1979: 40-41).

### **Some testable propositions**

Unfortunately, as mentioned above, most Austrians do not believe in quantitative evidence generated by statistical techniques, even when such evidence may be sympathetic to the theory (Bordo 1986: 455). The positivist claim is that it is always the statistics which test the theory, that it is the data which determine the theory. This suggests that they have more confidence in the data than the theory. Deductive reasoning is thus neglected (Garrison 1986b: 449). To avoid this here, the theory is first developed and statistical techniques are then employed to test for its validity.

From the Austrian school's account of the business cycle, Wainhouse developed nine testable propositions (Wainhouse 1984: 47-53; Van Zijp 1993: 103-105):

- 1 Changes in savings are governed by changes in time preferences and are independent of changes in the supply of credit. This reflects the view that the cycle is credit induced, and that money is non-neutral.
- 2 Changes in the supply of credit lead changes in the rate of interest.
- 3 Changes in the rate of change of credit lead changes in the output of producer goods. This reflects the discount-effect as these projects increase in value.
- 4 The ratio of producer goods prices to consumer goods prices tends to rise after the initiation of a credit expansion.

- 5 The prices of producer goods closest to final consumption tend to decline relative to the prices of producer goods further away from the later stages of production. This reflects the derived-demand effect.
- 6 The prices of consumer goods rise relative to the prices of producer goods, reversing the initial shift in relative prices as credit is contracted (towards the end of the cycle).
- 7 Towards the end of the upswing, unemployment should increase first in producer goods industries and then, with some lag, in consumer goods industries.
- 8 Employment expands in consumer goods industries as relatively more labour resources are applied both in response to the fall in real wages and in an effort to satisfy consumer demand.
- 9 Around the cycle's peak, inflation in raw materials exceeds the inflation in consumer goods prices.

These propositions are subjected to empirical tests in Chapter 4.

In conclusion, it is interesting to note that primitive societies have no capital structure which can become intertemporally dis-coordinated. Labour-intensive agricultural economies' intertemporal structure is determined more by the seasons than by credit conditions. They happen to be largely immune to the cyclical disturbances identified above. This is an empirical observation which is to be kept in mind.

### **Some policy implications**

From a capital theoretic point of view, the reason for depressions lies in the expansion of the money supply caused by credit creation which occurs during the upswing. It is monetary factors which cause the cycle while real factors constitute it (Machlup 1976: 23).

The money supply today has evolved from a fairly inelastic commodity money supply to an elastic fiat money supply system. This process is accompanied by the rapid rise of a sophisticated financial system. Central banks support the elasticity of the system in their roles as 'lenders of last resort' to prevent bank failures. The profitability of credit expansion is increased by the reduced risks of failure (Salin 1990: 214). The real danger lies when "money capital available all too freely begins to affect the sphere of real capital in which acts of substitution are not as readily reversible as in the financial sphere, and in which links of complementarity once forced may become virtually indissoluble" (Lachmann 1986: 105).

Stabilisation of an economy depends on the possibility of checking any over-issue of credit money. The aim is to make the money supply neutral in respect of the whole spectrum of relative prices. This implies that the market rate of interest reflects the time preference of agents or the natural rate of interest. The cluster of errors which are caused by malinvestment is only then avoided.

<sup>1</sup> Lower-order capital goods are employed in stages of production closer to final consumption while higher-order capital goods occur in stages further away from final consumption.



# 3

## Rival theories and their neglect of capital theory

### Keynesianism

According to Keynes there are no market mechanisms which can effectively allocate resources intertemporally (Keynes 1964: 165-167). The rate of interest is determined by the supply and demand for money (liquidity preference) while the decision to invest is based on the ‘animal spirits’ of entrepreneurs (Keynes 1964: 161-163; Davidson 1991: 39). The natural rate of interest of Wicksell has no place in *The General Theory*. “The concept of the ‘natural’ rate of interest...has [nothing] very useful or significant to contribute to our analysis” (Keynes 1964: 242-243). The saving-investment equality is considered to be an identity, hence it is neither possible nor necessary for the interest rate to coordinate saving and investment decisions (Leijonhufvud 1981: 135). The Keynesian analysis thus fails to capture the phenomenon of malinvestment.

Booms and busts occur with the waxing and waning of business confidence, by ‘overoptimism’ and ‘error of pessimism’ (Keynes 1964: 321-322). Economic downturns are attributes of a market economy. A sudden collapse in the demand for investment funds, triggered by an irrational and inexplicable loss of confidence in the business community, is followed by multiple rounds of decreased spending and income. The multiplier is a key element in explaining how small initial changes in spending could lead to significant economy-wide changes in output and employment. ‘Psychotic’ businessmen initiate the phases of the cycle, but ‘robotic’ consumers fulfil it (Herbener 1992: 80). The cycle is essentially a ‘bust-boom cycle’ as opposed to the Austrian “boom-bust cycle” (Garrison 1992: 137).

Unemployment is predominantly due to an insufficiency of aggregate demand. In the Keynesian macro world, prices remain completely rigid in both absolute and relative terms. Distortion of the system of relative prices and wages are ignored and there is an implicit assumption that all goods and services are available in abundance (Garrison 1989: 15). Increases in aggregate demand increase output and employment of all firms at a uniform rate throughout the economy (not unlike the helicopter effect of newly created money).

To Garrison (1987), the fact that Keynes’ General Theory contains no general theory of capital can imply that Keynes assumed a fixed stock of capital and thus a fixed capital structure, “an intertemporally persistent ‘structure’ of the economy that permits the use of monetary and fiscal policies as devices for stabilising, or ‘fine-tuning,’ the economy” (Bellante 1992: 119). This allows the focus of analysis to be shifted away from the thorny issues of capital and problems of intertemporal coordination to other macroeconomic magnitudes. The short-run consumption function becomes the keystone of the theory. The remainder of the theory is specified in terms of interest elasticities: the demand for investment funds is interest-inelastic (a steep IS-curve), and the demand for idle money balances is interest-elastic (a flat LM-curve) (Garrison 1992: 137).<sup>1</sup>

Keynesian multipliers, based on the propensity to consume, establish ‘*precise relationships*’ between employment and income and the rate of investment (Keynes 1964: 113 [italics added]). The same relationships hold irrespectively of where, given the structure of production, the investment is undertaken. The market for consumer goods always performs in accordance with the fundamentals of supply and demand while the market for investment goods never performs appropriately. Gross output and employment vary in direct proportion to the spending on investment goods. The theory has to assume idle resources otherwise a positive multiplier will be offset by a negative multiplier elsewhere as resources are drawn to the industry receiving the expenditure (Herbener 1992: 79).

Keynesianism today has developed along two lines, namely the post-Keynesian school and the neo-Keynesian school. A fixed capital structure is still assumed and the economy is still driven

by aggregate demand. Both schools continue trying to provide the academic rationale for government control and manipulation of the economy (Bellante 1992: 117-129).

Post-Keynesianism originated in Great Britain. It subscribes to the view that inflation is all of a cost-push variety, that money is endogenous, that money wages are determined by oligopolies and trade unions, and that there is a homogeneous capital stock (Rousseau 1985; Goldstein 1985).

Neo-Keynesianism has developed almost entirely in the United States. Neo-Keynesians try to explain equilibrium in markets without market-clearing in order to provide microeconomic foundations to Keynesianism. In this regard, the role of implicit contracts and efficiency wages in the labour market is very important (Gordon 1974; Azariadis 1975). This school has been very much influenced by New Classicism. For example, the long-run non-exploitability of an inflation-unemployment tradeoff is accepted.

Finally, Lachmann maintained that Keynesian economic analysis may be appropriate under certain circumstances, such as a severe depression or war and states that “The Keynesian economics is an economics of extreme situations; it fits the circumstances of war and postwar inflation with the universal shortage of labour and material resources just as much as it did the world of the early 1930s with almost universal unemployment and ‘excess capacity’. In other words, the Keynesian model fits reasonably well any world in which the various classes of factors of production are in approximately the same condition, and therefore can be *treated as though they were homogeneous*” (Lachmann 1977: 136 [italics added]). “It is here, and only here, that the famous ‘macro-economic’ method works satisfactory” (Lachmann 1977: 136). Under these circumstances, with homogeneous factors of production, intertemporal coordination presents no problem since all factors are complete substitutes for each other.

## Monetarism

Keynesians omit discussions of capital theory in an effort to emancipate economics from the thorny issues which surround its analysis. In the process they assume a fixed capital stock which renders their analysis appropriate only for the shorter run.

Monetarists avoid capital theory because markets are so well behaved that intertemporal discoordination presents no problem. Interest rates are determined by the supply and demand of loanable funds, a market which faithfully reflects actual constraints and opportunities in the investment sector. The concept of the natural rate of interest is accepted but deviations of the bank rate from the natural rate is denied, underlining how well behaved intertemporal markets are (Garrison 1992: 140). The theory is in essence a long-run theory, and the effects a change in the interest rate has on the economy’s structure of capital are neglected.

Friedman (1969: 271-277; 1993) has offered a ‘plucking model’ of the economy. He argues that real output shows an important ‘ceiling’ effect; growth rates are on average below the ceiling rate, but tend back to the ceiling rate. Aggregate demand disturbances (primarily from monetary shocks, in Friedman’s view) can reduce output below the ceiling, but the economy’s equilibrating forces (and possibly expansionary monetary policy in reaction to the recession) push the economy back to the ceiling with the size of the expansion thus related to the size of the preceding contraction.

The model is like a string glued to the underside of an inclined plane. The plane represents the Natural Rate Hypothesis<sup>2</sup> which is at the full-employment level. If the string is glued at every point along the plane, it will represent an economy with no cyclical problems at all. Cyclical problems can be represented by plucking the string downwards, at random intervals, along the plane. Recovery is necessarily related to the extent of the sag. As in Keynesianism, there appears to be a ‘bust-boom’ rather than a ‘boom-bust’ cycle (Garrison 1992: 138). The makeup of the string, representing the allocation of resources within the investment sector, and the consistency of the glue, representing the rate of interest and pattern of prices upon which resource allocation has been based during the boom, is not examined.

Intertemporal distortions which occur, are in terms of labour-leisure distortions. These distortions are spelled out in terms of short- and long-run Phillips<sup>3</sup> curves (Friedman 1976: 213-

237). The long-run Phillips curve is vertical since the Natural Rate Hypothesis denies any money illusions in the long-run. Long-term changes in the money supply only effect the general price level. Short-run non-vertical Phillips curves are explained as the result of expectation errors. The distortion of the structure of production by monetary injections has no role under monetarism. Newly created money has effects of overriding importance on wage rates while interest rates and the market for capital goods are not affected.

Thus, Monetarists understate the consequences of credit expansion by leaving out capital theory. Capital markets are efficient and nonhuman resources are always allocated appropriately. Labour markets involve temporary but systematic misallocations due to inflation-induced misperceptions of the wage rate.

### **New Classicism**

For this school of thought there is no distinction between markets which work right and markets which go wrong. All markets allocate resources efficiently. The hard core version of this school assumes price-taking behaviour, therefore, assuming that both intertemporal and a-temporal markets are governed by the fundamentals of supply and demand (Lucas 1981: 66-89 & 215-239). Coordination problems are eliminated by this assumption of price-taking behaviour (Lucas 1981: 19-58; Van Zijp 1993: 211).

This school advances the Rational Expectations Hypothesis (Muth 1961: 315) that expectations are essentially the same as the predictions of the relevant theory. They also distinguish between two types of knowledge namely local and global knowledge ( Phelps 1970; Barro 1976). Lucas (1981: 66-89) adopts Phelps's 'islands parable' in explaining how lags in global information can lead to errors in expectations of local prices. Monetary disturbances are capable of influencing real variables only when the agents do not have sufficient information and to the extent to which nominal price changes are mistaken for real changes. This means that monetary policy can only be successful by 'fooling' agents.

Barro (1980) also adopts the 'islands approach' by postulating an island economy in which agents trade in a local commodity market and a global capital market. Agents have to decide to what extent a change in the global nominal rate of return on assets is caused by real or nominal factors. Agents form rational expectations and know the 'true' probability distributions so that monetary shocks cannot induce expectational errors about the actual rate of return (Barro 1980: 1393-1417).

The two types of knowledge as illustrated in Figure 1 are thus converging for this school. Their market participants always tend to have knowledge within the structure (market knowledge) and learn very quickly about any changes to the structure. Business cycles are explained as the unintended results of misperceived decision situations (Van Zijp 1993: 170). Because capital theory is ignored by the assumption of continuous price-taking behaviour, the lags and the length of the lags between the two types of knowledge cannot be addressed (Garrison 1989: 20).

The New Classicists derive the so-called policy-ineffectiveness proposition. This proposition holds that monetary policy, when anticipated, is ineffective in stabilising economic activity (Sargent & Wallace 1975; Barro 1976). This leads to the neutrality proposition which implies that fixed-percent money growth rules are as effective or ineffective as active monetary stabilisation policies (Kydland & Prescott 1977). In game-theoretical terminology, agents' strategy can offset the intended effects of policy actions. Frydman, O'Driscoll and Schotter (1982) have shown that if policy makers have no uniquely rational course of action to follow, agents cannot form a rational expectation.

### **Conclusions**

In this chapter price-theoretical foundations to the business cycle were investigated. In terms of this critical foundation, the Austrian theory of the cycle is the most appealing theory because of its extensive use of capital theory which captures the universals of macroeconomics. The upswing is caused by an increase in credit expansion, giving rise to 'forced' savings, which lengthens the

production structure. This is reversed during the downswing due to the phenomena of ‘forced’ savings. Voluntary savings would have lengthened the structure of production permanently.

By taking an aggregate view of capital and investments, mainstream economists downplay important microeconomic factors, such as intertemporal markets, relative prices, the ‘injection’ effects of newly created money and the role of entrepreneurship.

While the purpose of theory is to explain, some testable hypotheses are found which are explored further in Chapter 4. This is done so as to add more credibility to the theory as interpreted in this thesis. The question of why cyclical booms are characterised by overinvestment in fixed capital (the most conspicuous form of higher-order capital goods) is one which predates any theoretical account of this phenomenon. The Austrian theory provides an understanding of the market mechanisms which can achieve an intertemporal coordination of economic activities and the consequences of interfering with these mechanisms.

The empirical analysis of the South African business cycle is now presented in Chapter 4.

- 1 The IS-curve represents equilibrium in the goods market while the LM-curve represents equilibrium in the money market.
- 2 The Natural Rate Hypothesis is that the economy will always be at the full employment of resources. Any movement away from full employment will only be temporary.
- 3 The short-run Phillips curves represent trade-offs between the price level and unemployment that can be temporarily exploited. Expectations will shift these curves towards points as defined by the long-run Phillips curve.

# 4

## Support for the Austrian theory from South African data

The market process approach shows that the critical link between macro- and micro-economics is embodied in capital theory. Capital theory also provides an unique explanation of the causes of the business cycle. It transmits its effects through monetary (and derivatives and associates) variables to the real sector. This study finds that the Austrian school's version of capital is more convincing than those of other mainstream schools. In fact, it is the only school which provides a comprehensive theory.

In this chapter, the validity of the Austrian school's theory of the business cycle is tested by using empirical data from South Africa's most recent cyclical experience viz 1980 to 1996. As background, South African cyclical history is outlined. Thereafter, the integrity of the data and the econometric methodology used for testing the empirical data is explained. The balance of the chapter is used to test the 'Austrian' business cycle theory, employing the nine propositions into which the theory was translated in Chapter 2.

There are two sections. The first section consists of causality testing of relationships contained in standard South African time series of credit, savings and interest rate movements. This illuminates the monetary causes of the business cycle. The second section consists of testing expected movements in relative prices in relation to domestic credit expansion. This illuminates malinvestments caused by credit expansion as a cause of the business cycle.

### **The South African business cycle: 1980-1996**

The South African business cycle has been well documented since 1945 by Smit and Van der Walt (1970 & 1973) and Van der Walt and Pretorius (1995).

According to Van der Walt and Pretorius, the business cycle in South Africa was in a downward phase from August 1981 to March 1983. The upward phase following lasted 15 months up to June 1984. This was followed by a contraction of 21 months ending in March 1986. The upswing lasted 35 months until February 1989. Then followed one of the worst recessions since the Great Depression. The economy contracted for 51 months until May 1993. Since then the economy has again been in an upward phase (Van der Walt & Pretorius 1995: 30-38). These turning points are particularly important in terms of the increases experienced in the rate of growth of credit analysed below.

The majority of leading indicators of the South African business cycle are to be found in stages of production further removed from final consumption such as the mining of gold ore, the physical volume of mining production (excluding gold), and net new companies registered. Other leading indicators such as net gold and other reserves and real merchandise exports point to the impact that these series have on the money supply in South Africa. The Reserve Bank creates new credit (expands its balance sheet) if it builds up foreign reserves from net export proceeds (Goedhuys 1983: 143). An increase in foreign reserves implies an increase in the deposits of banks and thus an increase in the money supply (Mohr, Botha & Inggs 1995: 13).

Figures 2 and 3 give a graphical exposition of the South African business cycle over this period in terms of real gross domestic (GDP) growth.

### **Data and methodology**

Standard South African data is used in the econometric testing of the validity of the theory that business cycles are caused by money and credit and their direct derivatives. The data consist of various credit, savings, price and investment series from the Reserve Bank's databank from the early 1980s to 1996, electronically provided by the Standard Bank's Cats-system. Monthly data are

used in most cases, because they provide a wider window than do quarterly data. The smoothing of the data does not change the results.

FIGURE 2

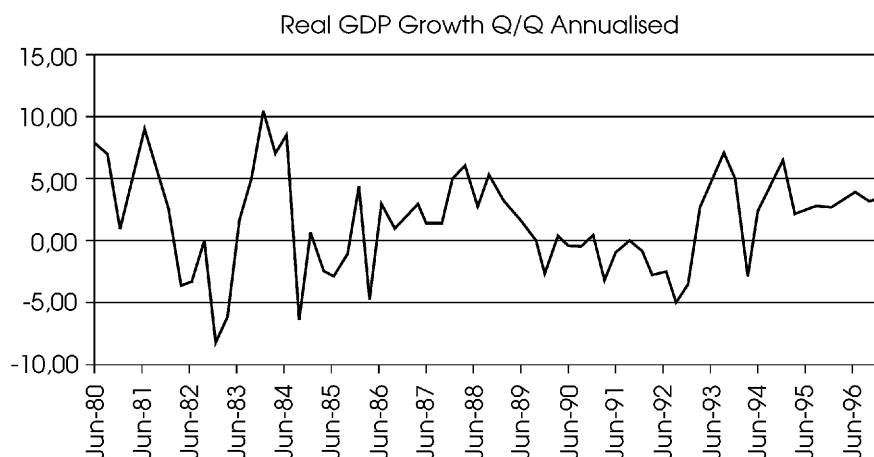
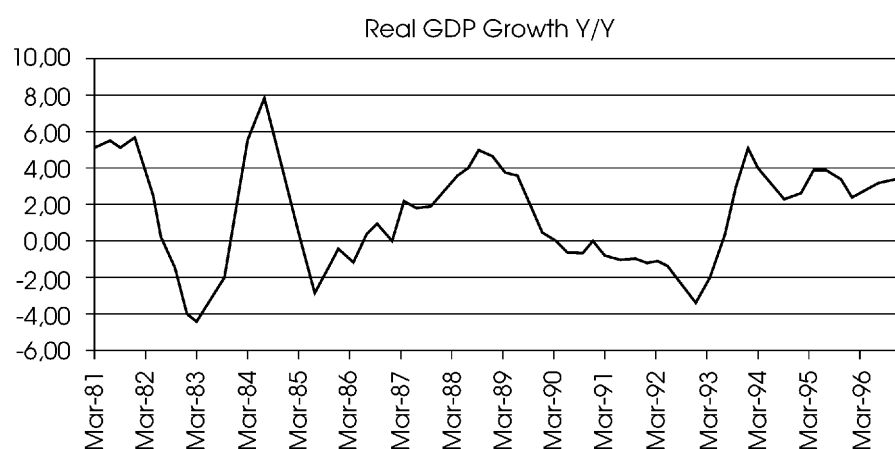


FIGURE 3



The choice of data was dictated by considerations of availability from the Reserve Bank databank. Virtually any choice of data can be regarded as objectionable. During the 1980s a long list of potential distortions were faced, mainly due to outside and inside political and economic pressures on South Africa. Prominent among these pressures was the debt standstill of 1984.

The data used for interest rates, credit and savings are in nominal terms as supplied by the issuing agency and not seasonally adjusted. The balance of the data is seasonally adjusted. These are the only data that are available and the quality may have been affected by the adjustment process. However, no obvious degeneration of the quality of the results, because of the adjustment process, is observed.

Propositions are grouped in three sections. Firstly, Propositions 1 to 3 are tested for causality, secondly, Propositions 4 to 6 are dynamically tested and lastly, Propositions 7 to 9 are derived from the previous 6 propositions.

The dynamics of the cycle are illustrated by means of graphical analysis of the behaviour of the respective series after the initiation of a credit expansion.

### Causality test of Propositions 1 to 3

Propositions 1 to 3 (which are repeated below) are tested by using Granger's predictability-based test for causality. The terminology used is that of 'Granger-cause' in place of 'cause' to adhere to the special definition of causality developed by Granger.

**Proposition 1:** Changes in the supply of savings is independent of changes in the supply of bank credit.

If this proposition is true, it suggests that financial institutions do not promptly adjust rates of interest to changes in economic data such as savings. The supply of credit is then largely independent of the real economic influence of changes in time preference.

‘Real’ is not intended to represent deflated, constant-price time series data, but rather the rigid reaction mechanisms of the economy to changes in tastes and preferences.

To test for the independence of savings and credit, the appropriate null hypotheses are:

- Ho :  $\Delta$  Savings does not Granger-cause  
 $\Delta$  Credit, and  
 Ho :  $\Delta$  Credit does not Granger-cause  
 $\Delta$  Savings

Where Ho denotes the null hypothesis and  $\Delta$  denotes changes.

These hypotheses are tested below using quarterly and monthly data for alternative measures of both credit and savings.

Table 1 gives the results for the quarterly percentage changes. S1P is the quarterly percentage change in total of short-term, medium-term and long-term deposits at commercial banks and C2P is the quarterly percentage change in total credit extended to the domestic private sector.

**Table 1:** Pairwise Granger-Causality Test – S1P and C2P

Sample:	1980:1	1996:4		
Lags <sup>a</sup> :	4			
Null hypothesis		Obs	F-Statistic	Probability
S1P does not Granger-cause C2P		30	2.21082	0.10266
C2P does not Granger-cause S1P			1.62480	0.20522

<sup>a</sup> The number of lags included in the test equation is chosen so that no auto-correlation is found in the error term.

<sup>b</sup> As a rule of thumb: an F-value of  $< 2.7$  implies acceptance of the null hypotheses.

The calculated F-values and results of the F-tests for this hypothesis uniformly support the notion that no causation exists between the two series at the 5 percent level of confidence. The probability values are larger than .05 which also supports the acceptance of the null hypotheses.

When percentage changes in monthly data were used, the results also supported the null hypotheses that no causation exists between credit and savings. This was so even when the variable S1P was augmented by cheques, transmission and other demand deposits at commercial banks. Changes in bank credit are thus insulated from changes in personal savings and are motivated principally by monetary policy and considerations of bank liquidity.

**Proposition 2:** Changes in the supply of credit lead changes in rates of interest.

Factors influencing the supply of credit are structural changes in monetary policy such as changes in reserve requirements, changes in the discount rate, open-market operations and changes in bank liquidity. The changes in the supply of credit are distributed by changes in interest rates. This proposition, along with Proposition 1, represents the causes of the business cycle. When the supply of credit expands, interest rates fall below the equilibrium or natural rate as determined by the supply of savings and investments. This is a necessary condition for forced savings to occur. The provision of additional credit to investors makes it possible for resources to be redirected from current consumption to investments without the prior provision of voluntary savings. Forced savings result as new credit causes commodity prices to rise which, in turn, reduces the spending power of all except those in possession of new credit.



In this proposition, credit is expressed by the same variable as in Proposition 1. The interest rates are the quarterly Bank Rate and the prime overdraft rate. Virtually any short-run interest rate could have been used as they all co-integrate with the Bank Rate during the chosen time period.

Table 2, for example, shows that the Bank Rate denoted by BRQ, and the prime overdraft rate denoted by RINT10Q co-integrate.<sup>1</sup> This co-integration implies that the two series are driven by the same economic forces and that they form a long-run relationship. The likelihood ratio for the Eigenvalue of 27.34080 is more than the 5 percent and 1 percent critical values, implying the existence of one long-run relationship.

This long-run relationship is depicted by the regression of RINT10Q on BRQ. Table 5 depicts this relationship as

$$\text{RINT10Q} = 3,699352 + 0.965537\text{BRQ} + 0.54773\text{AR}(1).$$

Note that the coefficient of BRQ is almost 1, implying that for each percentage increase in BRQ, RINT10Q will increase by almost the same percentage.

**Table 2:** Johansen Co-Integration Test<sup>a</sup>

Sample:	1984:1	1995:4		
Included observations:	47			
Test assumption:	No deterministic trend in the data			
Series:	BRQ RINT10Q			
Lags interval:	1 to 1			
Eigenvalue	Likelihood ratio	5 Percent Critical Value	1 Percent Critical Value	Hypothesised No. of CE(s)
0.334810	27.34080	19.96	24.60	None**
0.159733	8.179692	9.24	12.97	At most 1*
*(**) denotes rejection of the hypothesis at 5% (1%) significance level				
L.R. test indicates 1 co-integrating equation(s) at 5% significance level				
Unnormalised Co-integrating Coefficients:				
BRQ	RINT10Q	C		
0.507339	-0.505216	1.618225		
-0.134183	0.181317	-1.264920		
Normalised Co-integrating Coefficients: 1 Co-integrating Equation(s)				
BRQ	RINT10Q	C		
1.000000	-0.995815	3.189631		
	(0.01936)	(0.34839)		
Log likelihood	-4.657250			

<sup>a</sup> Table 2 like 3 includes much more information than required for the purpose of this monograph. It is nevertheless left in the comprehensive format for the benefit of those who also wish to verify other relationships than those needed to prove the arguments of this chapter.

**Table 3:**Regression Rint10q on Brq

LS//Dependent Variable is RINT10Q

Sample (adjusted): 1992:4 1995:3

Included observations: 52 after adjusting endpoints

Convergence achieved after 15 iterations

Variable	Coefficient	Std. Error	T-Statistic	Probability
C	3.699352	0.470934	7.855348	0.0000
BRQ	0.965537	0.031267	30.88012	0.0000
AR(1)	0.547663	0.126414	4.332286	0.0001
R-squared	0.987308	Mean dependent var		17.85897
Adjusted				
R-squared	0.986790	S.D. dependent var		3.195711
S.E. of				
regression	0.367293	Akaike info criterion		-1.947229
Sum squared				
resid	6.610309	Schwarz criterion		-1.834657
Log				
likelihood	-20.15685	F-statistic	1905.909	
Durbin-				
Watson stat	1.884352	Prob (F-statistic)		0.000000
Inverted				
AR Roots	.55			

All the statistical tests in the table support the relationship between the prime overdraft rate and the Bank Rate.

The null hypothesis for Granger-causality for the proposition that changes in the supply of credit lead changes in interest rates is

$$H_0 : \Delta \text{Credit does not Granger-cause} \\ \Delta \text{ rate of interest}$$

The results of the test are shown in Table 4.

Given the values of the F-statistics and the probability values in Table 4, the null hypothesis is accepted that BRQP does not Granger-cause C1P since the F-value is less than 2.7. The null hypothesis that C1P does not Granger-cause BRQP is rejected at the 5 percent level of confidence since the F-value exceeds 2.7. It is thus confirmed that C1P Granger-causes BRQP.

**Table 4:** Pairwise Granger-Causality Tests – Credit and Bank Rates

Sample: 1980:1 1996:4

Lags: 2

Null hypothesis	Obs	F-Statistic	Probability
BRQP does not Granger-cause C1P	50	2.13853	0.12965
C1P does not Granger-cause BRQP		3.60672	0.03525

The same results can be found for the prime overdraft rate or for any series of short-run interest rates such as the 32 days notice deposits rate with clearing banks.

Proposition 2, that changes in the supply of credit lead changes in interest rates, receives significant support from the data analysis. The next proposition, a credit-induced cycle, is now considered.

**Proposition 3:** Changes in the rate of credit growth lead changes in the output of producer goods.

This proposition supports the occurrence of forced savings. A credit expansion which causes lower rates of interest should result in an expansion of investment activities. The lower interest rates create the impression that households' time preference is reduced and that savings are increasing. This expansion in investment (expenditure on producers' equipment) results in a shift in resources from consumption to investment activities.

The associated null hypothesis for the proposition that changes in the rate of credit growth lead changes in the output of producer goods is:

$$H_0 : \Delta \% \Delta \text{ Credit does not Granger-cause} \\ \Delta \text{ output of producer goods}$$

For measures of output of producer goods, two series were used and tested for causality. The two series are the percentage change in the quarterly data for manufacturing and the percentage change in total production of secondary industries at constant 1990 prices. In this form, both series are stationary.

Table 5 gives the results for the Granger-causality tests between manufacturing series (R6 034 DP) and changes in the rate of credit growth D(C1P).

**Table 5:** Pairwise Granger-Causality Tests – Manufacturing and Credit Growth

Sample:	1980:1	1996:4		
Lags:	4			
Null hypothesis	Obs	F-Statistic	Probability	
R6 034 DP does not				
Granger-cause D(C1P)	48	1.67882	0.17444	
D(C1P) does not				
Granger-cause R 6 034 DP		2.44854	0.06223	

The critical F-statistic obtained from the critical values of the F Distribution is 2.25 at the 95 percent confidence level (Mirer 1995: 416-417) and the second null hypothesis, that D(C1P) does not cause R6 034 DP, is rejected since its F-statistic value of 2.44854 is greater than this critical value. The first, that R6034 DP does not cause D(C1P), is accepted at the 95 percent level of confidence as its F-statistic is less than the critical F-statistic. D(C1P) thus causes R6 034 DP. Also the probability value of 0.06223 shows that the second null hypothesis is rejected at the 93.777 percent level of confidence.

**Table 6:** Pairwise Granger-Causality Tests – Secondary Industry and Credit Growth

Sample:	1980:1	1996:4		
Lags:	4			
Null hypothesis	Obs	F-Statistic	Probability	
TOT603P does not				
Granger-cause D(C1P)	48	1.56403	0.20312	
D(C1P) does not				
Granger-cause TOT603P		2.35820	0.07024	

Table 6 repeats the test for secondary industry (TOT603P). The second null hypothesis, that D(C1P) does not Granger-cause TOT603P, is again rejected at the 95% confidence level while the first is accepted. The probability value shows rejection of the second null hypothesis at the 92.976 percent level of confidence. Thus D(C1P) causes TOT603P.

The evidence thus supports Proposition 3, that is, unidirectional causality runs from credit to output of producer goods.

Propositions 1 to 3 are supported by the empirical tests. Changes in savings are independent of changes in the supply of bank credit, the latter leading changes in interest rates. Changes in the rate of credit growth are also found to lead changes in the output of producer goods. These propositions confirm the monetary causes of cyclical fluctuations.

#### **Propositions 4 to 9: The dynamics of the business cycle**

This section considers the dynamics of the business cycle. The validity of Propositions 4 to 6 is directly tested while the validity of Propositions 7 to 9 is indirectly derived. Propositions 4, 5 and 6 relate to the movements of relative prices after the initiation of credit expansion. Propositions 7 to 9 relate to the movements of unemployment, real wages and relative prices around the cyclical peak. Propositions 7-9 are not formally tested since the extent to which movements in real resources are concomitant with changes in relative prices. The results on relative price movements – Propositions 4 to 6 – support Propositions 7 to 9.

**Proposition 4:** The ratio of producer prices to consumer prices tends to rise after the initiation of a credit expansion.

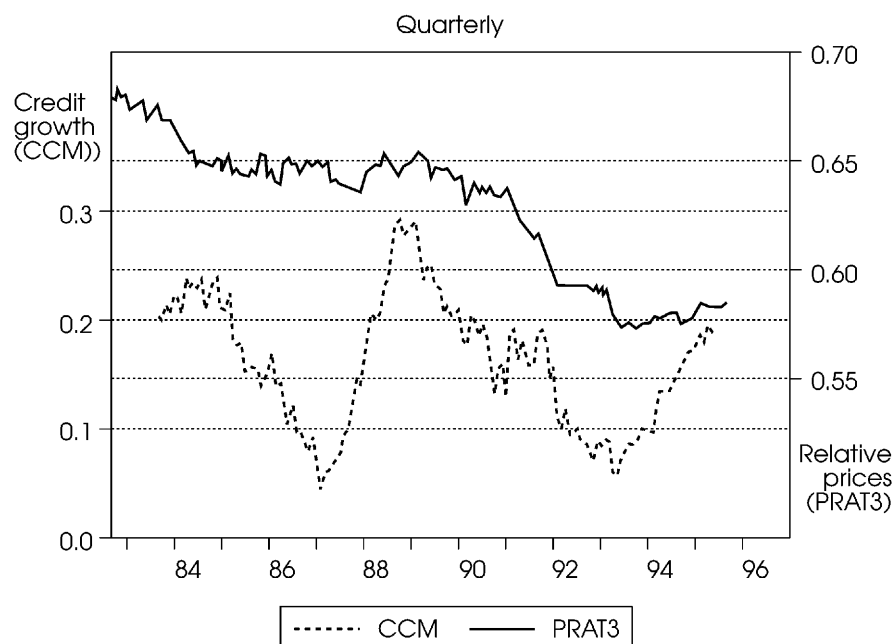
The series for credit is the quarterly changes in the rate of growth in bank credit. The measure for consumer prices is the quarterly changes in the Reserve Bank's R7032N series which is the seasonally adjusted index of consumer prices in South Africa. For producer prices, quarterly changes in the Reserve Bank's R7050N series which is the index of producer goods prices in South Africa are used.

Figure 4 plots the ratio of changes in producer goods prices to changes in consumer goods prices, PRAT3 (relative prices) and the quarterly changes in the growth of credit CCM, where credit is the total of credit extended to the domestic private sector for investments ( r1360m), bills discounted ( r1361m), instalment sales ( r1362m), leasing finance ( r1363m ), mortgage advances ( r1364m) and other loans and advances ( r1365m). The codes in brackets are the Reserve Bank series codes.

Figure 4 shows that after the initiation of a credit expansion (1987 and 1993) the series PRAT3 increases, which supports the proposition.

This implies that initially the prices of consumer goods decline relative to the prices of producer goods following the initiation of a credit expansion. Increases in the rate of growth of credit also correspond with the upswings in the business cycle, while decreases in the rate of growth in credit correspond with the downswings in the business cycle. It is significant to see that the credit cycle corresponds with the business cycle plotted in Figure 2.

FIGURE 4



**Proposition 5:** After the initiation of a credit expansion the prices of goods closer to final consumption tend to decline relative to the prices of producer goods further away from consumer goods in the production structure.

Following the same approach, the relative prices of specific series of the Reserve Bank's consumer prices and specific series of the production prices are compared with credit growth. The Reserve Bank's series are all seasonally adjusted with 1990 as base year.

Figures 5 to 8 show the results obtained for monthly data. Figure 5 shows the monthly changes in credit growth and PRAT6 which is the relative consumer prices of clothing and footwear (Reserve Bank's 7026N series) to the manufacturing prices of clothing and footwear at the manufacturing level (Reserve Bank's 7042N series). Both these series are relatively close to final consumption, with consumer prices closer to final consumption than manufacturing prices.

The initiation of a credit expansion in 1987 and 1993 led to a decrease in the ratio  $r7026/r7042$  (PRAT6), as can be seen from Figure 5.

Figure 6 shows the same pattern for the total of consumer goods prices (7031n) relative to basic metal and product prices (7043n) as indicated by PRAT7. The same pattern as in Figure 5 can be observed. The initiation of a credit expansion led to a decrease in PRAT7.

Figures 7 and 8 show the same pattern for other relative prices at the initiation of a credit expansion.

Figure 7 shows that PRAT8, which is the ratio of consumer prices of clothing and footwear (the Reserve Bank's r7026 series) to the prices of basic metal and products clothing (the Reserve Bank's r7026 series), decreases after an increase in credit growth.

Figure 8 shows the same result for PRAT9, which lists the monthly prices of clothing and footwear to machinery and transport equipment prices (the Reserve Bank's r7044 series). This series decreases after an increase in credit growth.

The prices of goods further away from final consumption increase relative to the prices of goods closer to final consumption after an increase in credit growth.

The illustrated confirmation of Propositions 4 and 5 is consistent with either a credit expansion (forced savings) or an autonomous increase in prices. If it is an autonomous increase in savings, the shifts in relative prices are permanent and self-perpetuating. In the illustrations it is due to credit expansion, and therefore the shifts are temporary.

However, as the changes in relative prices are the result of changes in the rate of credit expansion, these changes are reversed in time. This is confirmed by the examination of Proposition 6.

**Proposition 6:** The prices of consumer goods rise relative to the prices of producer goods, towards the end of the credit expansion, reversing the initial shift in relative prices.

If this proposition holds, the relative prices of consumer goods to producer goods will show an increase and the evaluated relative prices will, if translated into a graph, assume a parabolic shape.

Figures 5 to 8 clearly indicate that the relative prices increase as credit growth decreases as implied by the observed parabolic shape. Therefore Proposition 6 is confirmed by the graphs.

FIGURE 5

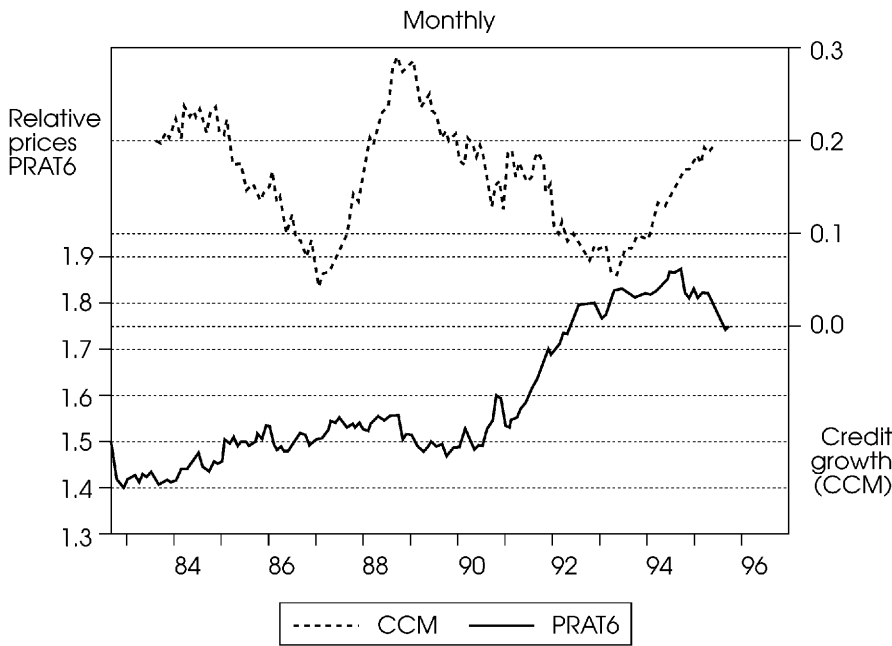


FIGURE 6

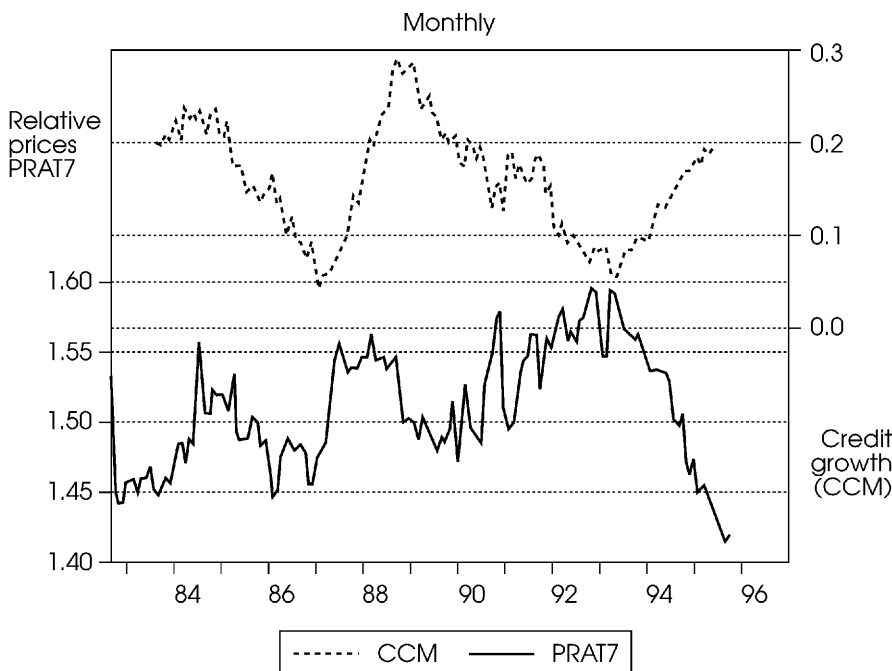


FIGURE 7

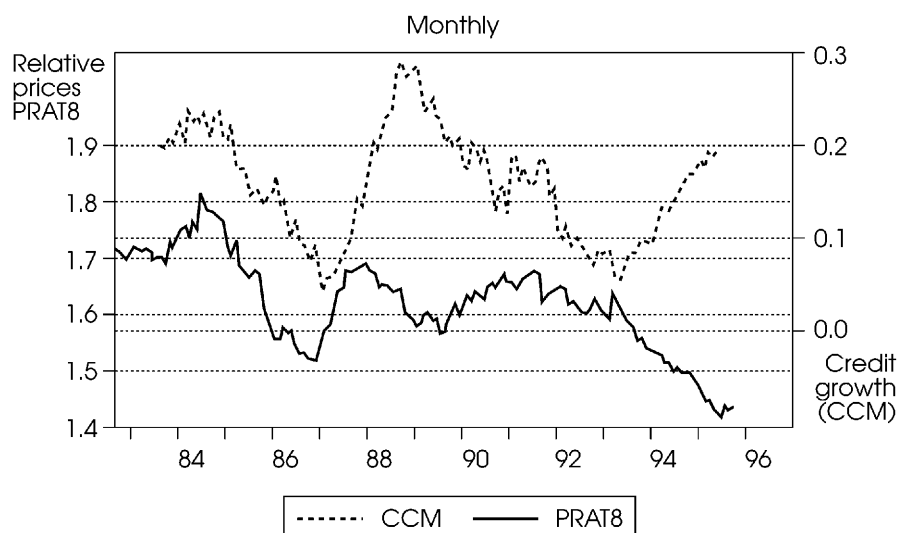
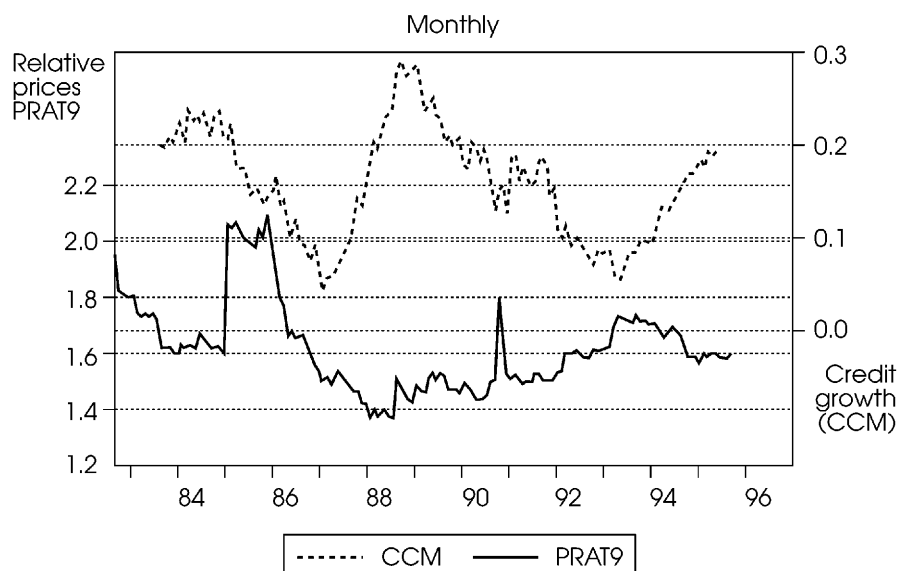


FIGURE 8



**Proposition 7:** Towards the end of the cycle, unemployment should increase first in producer goods industries and then, with some lag, in consumer goods industries.

To the extent to which movements in real resources are concomitant with changes in relative prices, support for this proposition is obtained by observing the behaviour of relative prices of consumer goods to prices of producer goods. As seen in Figures 3 to 8, the relative prices of goods increase towards the peak of the expansion of credit implying a movement of employment away from producer goods to consumer goods. This results in an increase in unemployment in the producer goods industries, to the extent to which labour is heterogeneous and specific.

**Proposition 8:** Employment expands in the consumer goods industries as relatively more labour resources are applied both as a result of a fall in real wages and in an effort to satisfy consumer goods demand in the neighbourhood of the cycle peak.

Again it can be argued that this proposition is satisfied because of the statistical conformation obtained in Figures 3 to 8. The prices of consumer goods lag behind the prices of producer goods, implying a decrease in relative wages in the consumer goods industries. At the same time, the demand for consumer goods increases.

***Proposition 9:*** Around the cycle peak, inflation in raw material prices exceeds that in consumer goods prices.

Here, raw material is meant to be non-specific circulating capital which is used as inputs in the production of consumer goods. These resources are attracted to the later stages of the production of consumer goods away from industries producing producer goods. The resulting shortage of these producer goods has the effect of their prices rising faster than consumer goods prices.



# 5

## Conclusions

Given the empirical results presented above, evidence is found which supports propositions consistent with a credit induced cycle of the Austrian variety.

The empirical evidence marshalled, reflects the non-neutrality of money and that the cycle is credit induced. Changes in credit lead changes in the interest rate and the output of producer goods.

The intertemporal misallocation of investments is reflected by changes in producer prices and consumer prices. The former increases relative to the latter when credit is expanded, and the latter increases relative to the former when credit is contracted. Employment is governed by these intertemporal changes in prices.

The conduct of monetary policy in South Africa over this period has allowed for the creation of credit unassociated with increases in savings, giving rise to a 'forced' saving effect. Furthermore, it has been unable to prevent the misallocation of investments (malinvestments) and the structural changes due to this misallocation.

If investments are treated as heterogeneous, which implies a disaggregated view, much more can be learned from the microeconomics of the business cycle. Credit expansion encourages investment in general, but it particularly favours indirect methods of production. In an investment boom, changes to the structure of production are inevitable, but unwarranted changes are manifest when monetary expansion is responsible. With many types of labour specifically attached to particular types of employment, unemployment must arise when malinvestments reveal themselves.

Butos (1993) found similar evidence for the United States of America over the period 1973 to 1991, indicating that the Austrian cycle occurs whenever credit expansion and contraction is involved. Since both theory and empirical evidence provide support for the Austrian view of the business cycle, attention by policy makers to this neglected case of economics is perhaps well-overdue.

## Bibliography

- Azariadis, C. 1975. Implicit contracts and underemployment equilibria. *Journal of Political Economy*, 83: 1183-1202.
- Barro, R.J. 1976. Rational expectations and the role of monetary policy. *Journal of Monetary Economics*, 2: 1-32.
- Barro, R.J. 1980. A capital market in an equilibrium business cycle model. *Econometrica*, 48: 1393-1417.
- Bellante, D. 1992. The Fork in the Keynesian Road: Post-Keynesians and New-Keynesians. In: Skousen, M. (ed.) *Dissent on Keynes: A critical appraisal of Keynesian economics*. New York: Praeger, 117-129.
- Bordo, M.D. 1986. Austrian influence on business cycle theory: Comment on Garrison. *Cato Journal*, 6(2): 455-459.
- Butos, W.N. 1985. Hayek and general equilibrium analysis. *Southern Economic Journal*, 52: 332-343.
- Butos, W.N. 1993. The Recession and Austrian Business Cycle Theory: An empirical perspective. *Critical Review*, 7: 277-306.
- Cochran, J.P. & Glahe, F.R. 1994. The Keynes-Hayek debate: Lessons for contemporary business cycle theorists. *History of Political Economy*, 26(1): 69-94.
- Davidson, P. 1991. *Controversies in Post Keynesian Economics*. Brookfield: Edward Elgar.
- Egger, J.B. 1986. A Sympathetic Critic of the Austrian Business-cycle Theory. In: Kirzner, I.M.(ed.) *Subjectivism, Intelligibility and Economic Understanding*. New York: New York University Press, 56-71.
- Estey, J.A. 1956. *Business cycles*. 3rd ed. Englewood Cliffs: Prentice-Hall.
- Friedman, M. 1969. *The optimum quantity of money and other essays*. Chicago: Aldine.
- Friedman, M. 1976. *Price theory*. Chicago: Chicago University press.
- Friedman, M. 1993. The "Plucking model" of business fluctuations revisited. *Economic Enquiry*, 31: 171-177.
- Frydman, R., O'Driscoll, G.P. Jr. & Schotter, A. 1982. Rational expectations of government policy: An application of Newcomb's problem. *Southern Economic Review*, 49: 311-319.
- Garrison, R.W. 1986b. Hayekian trade cycle theory: A reappraisal. *Cato Journal*, 6(2): 437-453.
- Garrison, R.W. 1987. Full employment and intertemporal co-ordination: A rejoinder. *History of Political Economy*, 19(2): 335-341.
- Garrison, R.W. 1989. The Austrian theory of the business cycle in the light of modern macroeconomics. *Review of Austrian Economics*, 3: 3-29.
- Garrison, R.W. 1992. Is Milton Friedman a Keynesian? In: Skousen, M. (ed.) *Dissent on Keynes: A critical appraisal of Keynesian economics*. New York: Praeger, 131-147.
- Goedhuys, D.W. 1983. The business cycle and public policy. *South African Journal of Economics*, 52(2): 133-145.
- Goldstein, J. 1985. Pricing, accumulation and crisis in Post-Keynesian theory. *Journal of Post Keynesian Economics*, 8: 121-134.
- Gordon, D. 1974. A neo-classical theory of Keynesian unemployment. *Economic Inquiry*, 12: 431-459.
- Granger, C.W.J. 1980. Testing for Causality: A personal viewpoint. *Journal of Economic Dynamics and Control*, 2(4): 330-335.
- Grossman, S.J. 1989. *The informational role of prices*. Cambridge: MIT.
- Gunning, J.P. 1985. Causes of unemployment: The Austrian perspective. *History of Political Economy*, 17(2): 223-244.
- Hayek, F.A. 1945. The use of knowledge in society. *American Economic Review*, 35: 519-530.
- Hayek, F.A. 1979. *Unemployment and monetary policy: Government as generator of the business cycle*. Cato paper no 3. Washington: Cato Institute.

- Herbener, J.M. 1992. The Myths of the Multiplier and the Accelerator. In: Skousen, M. (ed.) *Dissent on Keynes: A critical appraisal of Keynesian economics*. New York: Praeger, 73-88.
- Keynes, J.M. 1964. *The general theory of employment, interest, and money*. New York: Harcourt Brace Jovanovich.
- Kirzner, I.M. 1984. Prices, the communication of knowledge, and the discovery process. In: Leube, K.R. & Zlabinger, A.H. (eds.) *The Political Economy of freedom: Essays in Honour of Hayek*. Munich: Philosophia Verlag.
- Kydland, F.E. & Prescott, E.C. 1977. Rules rather than discretion: The inconsistency of optimal plans. *Journal of Political Economy*, 85: 473-491.
- Lachmann, L.M. 1977. *Capital, Expectations and the Market Process*. Kansas City: Sheed Andrews & Mcmeel.
- Lachmann, L.M. 1978. *Capital and Its Structure*. Kansas City: Sheed Andrews & Mcmeel.
- Lachmann, L.M. 1986. *The Market as an Economic Process*. New York: Basil Blackwell.
- Leijonhufvud, A., ed. 1981. *Information and Co-ordination*. New York: Oxford University press.
- Leijonhufvud, A. 1984. What would Keynes have thought about rational expectations: In: Worswick, D. & Trevithick, J. (eds.) *Keynes and the Modern World*. Cambridge: Cambridge university press.
- Lucas, R.E., Jr. 1981. *Studies in Business Cycle Theory*. Cambridge: MIT.
- Machlup, F. 1976. Hayek's Contribution to Economics. In: Machlup, F. (ed.) *Essays on Hayek*. Michigan: Hillsdale, MI: Hillsdale College Press: 13-59.
- Mankiw, N. 1990. A quick refresher course in macroeconomics. *Journal of Economic Literature*, 28: 1645-1660.
- McConnel, C.R. & Brue, S.L. 1987. *Economics*. 10th ed. New York: McGraw-Hill.
- Modigliani, F. 1986. Life cycle, individual thrift and the wealth of nations. *American Economic Review*, 76(3): 297-313.
- Mohr, P. & Rogers, C. 1991. *Macroeconomics*. 2nd ed. Johannesburg: Lexicon.
- Mohr, P.J., Botha, Z.C. & Inggs, E.J. 1995. *The Practical Guide to South African Economic Indicators*. 2nd ed. Johannesburg: Lexicon.
- O'Driscoll, G.P., Jr. & Shenoy, S.R. 1976. Inflation, Recession, and Stagflation. In: Dolan, E.G. (ed.) *The Foundations of Modern Austrian Economics*. Kansas City: Sheed & Ward, 185-214.
- O'Driscoll, G.P., Jr. & Rizzo, M.J. 1985. *The Economics of Time and Ignorance*. New York: Basil Blackwell.
- Phelps, E.S., ed. 1970. *Microeconomic Foundations of Employment and Inflation Theory*. New York: Norton.
- Rothbard, M.N. 1972. *America's Great Depression*. 3rd ed. Kansas City: Sheed Andrews & Mcmeel.
- Rousseau, S. 1985. A markup theory of bank loan rates. *Journal of Post Keynesian Economics*, 8: 135-144.
- Sargent, T.J. & Wallace, N. 1975. Rational expectations, the optimal monetary instrument and the optimal money supply rule. *Journal of Political Economy*, 83: 241-254.
- Skousen, M. 1990. *The Structure of Production*. New York: New York University press.
- Skousen, M. 1992. Keynes and the Anti-saving Mentality. In: Skousen, M. (ed.) *Dissent on Keynes: A Critical Appraisal of Keynesian Economics*. New York: Praeger, 89-116.
- Smit, D.J. & Van der Walt, B.E. 1970. Business cycles in South Africa during the post-war period, 1946 to 1968. *South African Reserve Bank Quarterly Bulletin*, September.
- Smit, D.J. & Van der Walt, B.E. 1973. Business cycles in South Africa during the period, 1968 to 1972. *South African Reserve Bank Quarterly Bulletin*, June.
- Sowell, T. 1980. *Knowledge and Decisions*. New York: Basic Books.
- Steele, G.R. 1992. Hayek's contribution to business cycle theory: A modern assessment. *History of Political Economy*, 24(2): 477-491.
- Steele, G.R. 1996. *The Economics of Friedrich Hayek*. London: Macmillan.
- Thomsen, E.F. 1992. *Prices and Knowledge: A Market-Process Perspective*. London: Routledge.

- Valentine, L.M. & Ellis, D.F. 1991. *Business Cycles and Forecasting*. Cincinnati: South-Western.
- Van der Walt, B.E. & Pretorius, W.S. 1995. Business cycles in South Africa during the period 1986 to 1993. *South African Reserve Bank Quarterly Bulletin*, March.
- Van Zijp, R. 1993. *Austrian and New Classical Business Cycle Theories*. Longfield: Edward Elgar.
- Wainhouse, C.E. 1982. *Hayek's Theory of the Trade Cycle: The Evidence from the Time Series*. New York: New York University. ( Ph.D. thesis.)
- White, L.H. 1992. Afterword: Appraising Austrian Economics: Contentions and Misdirections. In: Caldwell, B.J. & Boehm, S. (eds.) *Austrian Economics: Tensions and New Directions*. Boston: Kluwer, 257-268.
- Wood, J.S. 1984. Some refinements in Austrian trade-cycle theory. *Managerial and Decision Economics*, 5(3): 141-149.