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Business, Monetary and Credit Cycles in Theory

The literature on business cycles is vast and that on monetary and credit cycles ever growing. That means any summary of business and credit cycle theory is unlikely to be comprehensive and will always be to some extent superficial. It is also a fact that different theories of the cycle often have a number of common elements, so making fine distinctions between them is difficult. Many theories of the business cycle also imply a monetary or credit cycle of some form, for example those that involve overoptimistic expectations and fixed investment in need of long-term finance. To the extent the two cycles are distinct many have argued that business cycle downturns following a boom in money and credit tend to be larger (Jordà et al. 2013). So in many theories the business, monetary and credit cycles are closely intertwined and difficult to separate. Nevertheless it is necessary to attempt a summary of some of the key theories behind business, monetary and credit cycles in order to provide context.

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2.1 Business Cycle Definition

As discussed in Harding and Pagan (2006) there are different forms of behaviour that can be classed as "cyclical". Often researchers use very different definitions of the cycle and this can lead to confusion when comparing results across empirical studies.

We might start with the definition of the business cycle by Burns and Mitchell (1946) who were pioneers in the precise measurement of the business cycle at the National Bureau of Economic Research (NBER):

> Business cycles are a type of fluctuation found in the aggregate economic activity of nations that organize their work mainly in business enterprises: a cycle consists of expansions occurring at about the same time in many economic activities, followed by similarly general recessions, contractions, and revivals which merge into the expansion phase of the next cycle; this sequence of changes is recurrent but not periodic.

They also had a view on the duration of such cycles:

> In duration business cycles vary from more than one year to ten or twelve years; they are not divisible into shorter cycles of similar character with amplitudes approximating their own.

Today business cycles are typically described as medium-term fluctuations lasting around 2–8 years based on subsequent analysis of US data in the post-war period.

Lucas (1975) offered a narrower, more precise definition of the economic cycle

> real output undergoes serially correlated movements about trend which are not explainable by movement in the availability of factors of production.

Serial correlation means that today's output fluctuation depends to some extent on previous period's fluctuations. So Lucas's definition would suggest that the cycle is simply the serially correlated component

of what is left over after removing the trend from output, and that the trend is driven by full employment of the available factors of production.

This shows it is important to be clear about the definition of the cycle. Burns and Mitchell largely think of the cycle in terms of identifying expansions and contractions in the *level of activity.* This is often called *classical* cycle analysis. Lucas on the other hand articulates cycles in terms of the movement of *output relative to trend*. So a cycle is envisaged as a period of above trend growth followed by a period of below trend growth. This type of cycle is typically known as a *growth* cycle to distinguish it from the classical Burns and Mitchell definition. We return to this distinction in Chapter 3 when we discuss the different methods of deriving metrics on the business cycle.

2.2 Impulse and Propagation of Business Cycles

It was the Norwegian economist Ragnar Frisch who emphasised the distinction between impulse and propagation (Frisch 1933). Economic shocks to the supply and demand of commodities are the *impulses* that disturb the economy away from a steady growth path or equilibrium position. And various lags, adjustment costs and other *propagation* mechanisms, both within and across sectors and industries, are what cause the movement in output following the impulse to be persistent and "cyclical" in nature. This view lends itself more to the growth cycle view than the classic cycle view but both are compatible for example if contractions in output in a classical cycle are largely the result of negative shocks to demand or a financial crisis.

Theories of the cycle that are based on frequent random impulses to the economy are normally described as stochastic models of the cycle. Alternative theories of such cycles then place different weight on the nature of the impulses that lead to fluctuations—for example whether the shocks are real or monetary—and also often differ on the nature of the propagation mechanism.

However in extreme cases the cycle may not involve random shocks and can be completely deterministic where the cycle occurs endogenously. For example, the famous cobweb theory where supply is a function of previous period's prices can lead to endogenous "periodic" cycles without the need for shocks. Such deterministic cycles are often characterised by sinusoidal waves where the cycle persists forever in a regular pattern but in principal can also be chaotic or degenerate. The simplest form of deterministic cycle is a cosine wave

$$c_t = r^t a \cos(bt)$$

where $r^t a$ is the amplitude of the cycle which is damped if $r < 1$. b is the frequency of the cycle and the period of the cycle q is the number of time periods it takes to complete a cycle, which is given by

$$q = 2\pi / b$$

This deterministic cycle is shown in Fig. 2.1. One can of course combine the idea so that there can be stochastic cycles which are also periodic. In other words cycles are driven by shocks but have fundamental periodic cycles within the propagation mechanism. So a stochastic

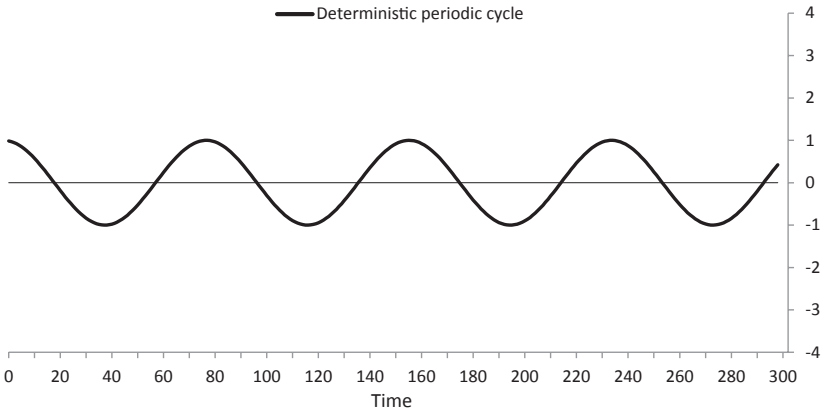

Fig. 2.1 Deterministic periodic cycle

"periodic" cycle will imply that a single shock in itself will generate a subsequent cycle that could in principle last forever—a "rocking horse" cycle is the name given to it by Frisch—taking the form of a sinusoidal wave although as discussed this may be damped with the amplitude of the cycle generated diminishing over time. In a stochastic periodic cycle what we then observe as the economic cycle is in fact a series of overlapping waves driven by positive and negative shocks. The cycles arising from each shock may be damped but new shocks give the overall cycle new "energy" in the words of Frisch.

This discussion suggests it is important to be clear what is meant by a cycle. It is possible for a "cycle" in the sense of Lucas to be generated by successive positive and negative shocks working through persistent mechanisms that generate serially correlated movements in output. Each shock in itself does not lead to a cycle but rather a persistent movement away from trend, possibly "hump-shaped", that then dissipates to zero over time asymptotically rather than causing a persistent movement in output in the opposite direction further out in time. But because positive shocks to output are followed by negative shocks to output this generates what might look like a cycle over time. For example we might have the simple autoregressive or AR(1) model:

$$c_t = \theta c_{t-1} + v_t$$

Figure 2.2 shows how a sequence of "white noise" shocks (zero mean and unit variance) generated by this process can look similar to a stochastic version of the periodic cycle shown in Fig. 2.1 even though the inherent propagation mechanisms are different.

We evaluate these differences later when we discuss econometric models of the cycle. However it is worth noting at this point that given the difficulty in defining what a cycle is, many prefer to be agnostic and talk about economic "fluctuations" as discussed in Ashton's (1959) classic work[1] on C18th England.

[1]Ashton (1959, p. 2).

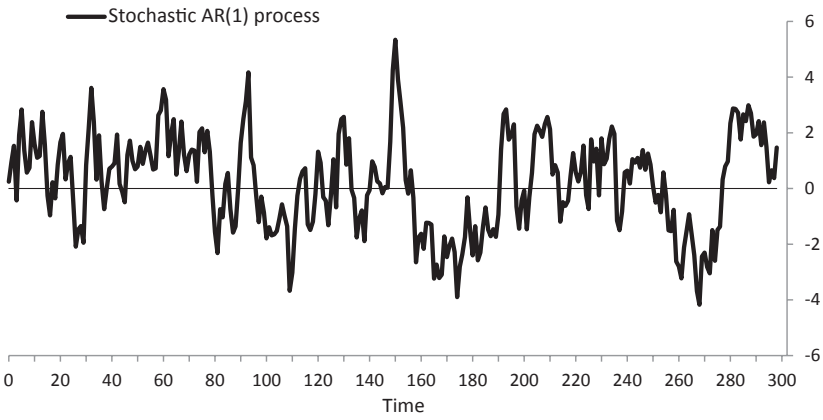

Fig. 2.2 Serially-correlated AR(1) cycle

2.3 Classical Theories of the Business Cycle

Today business cycles are described as medium-term fluctuations lasting around 2–8 years. However the early pioneers of business cycle analysis were interested in a wide range of short, medium and long-term fluctuations in output. So business cycle theory encompassed a number of different concepts and ideas. Interest in business and credit cycles began during the C18th and C19th following the development of market-based industrial economies and the periodic booms, downturns and financial crises that went with them. This analysis reached its peak in the first half of the C20th as the economic data required to analyse such cycles was more readily available. By the time of Schumpeter's two-volume analysis in 1939 (Schumpeter 1939) business cycles were classified into different types of cycle, largely based on their periodicity and typically named after their originator.

The "Kitchin" inventory cycle of 2–5 years

The articulation of the classic inventory cycle is usually attributed to Kitchin (1923) although the role of inventories had been identified earlier. This theory is typically associated with unexpected shifts in consumer demand. A fall in demand initially leads to some fall in

output and or prices, but is partly absorbed in the short run by companies building up stocks. However at some point in the future, if the fall in demand is persistent then eventually firms will want to destock this adds to the fall in output or, if expenditure picks up may delay a recovery in output. So the output response to shifts in demand takes the form of a short cycle.

The Juglar cycle of 7–11 years

The classical medium-term business cycle was identified by Juglar in the C19th. Juglar's study (Juglar 1862) was largely empirical but the Juglar cycle is typically associated with movements in fixed investment spending, the source of which might be expectations of future demand or in response to technological shocks. Juglar was the first to consider different phases of the cycle in terms of boom, slump and recovery.

The Kuznets cycle of 15–25 years

Simon Kuznets identified a longer cycle in 1930 (Kuznets 1930). He ascribed these swings to movements in building and infrastructure investment which he associated with large scale movements in immigration and population. The driver of these cycles has often been argued to be shifts in land prices that follow large scale migration movements which develop incentives for business and infrastructure development. The movements in migration themselves are the results of divergent real wages in developing parts of the world that prompts shifts in labour.

The Kondratieff long technological cycle of 45–60 years

Cycles of even longer duration were identified by Kondratieff in the 1920s. Kondratieff's study (see Kondratieff and Stolper 1935 for the English translation) was largely empirical and sought to identify the various characteristics of such cycles, such as the fact that innovations tended to cluster in downswings and their application in upswings. Most interpretations of these very long cycles are that they represent waves of technological development and innovation that often take time for their full benefits to work through. Schumpeter developed a particular theory behind Kondratieff waves with the idea of clustered innovations driving investment and productivity (Schumpeter 1939; Mensch 1979).

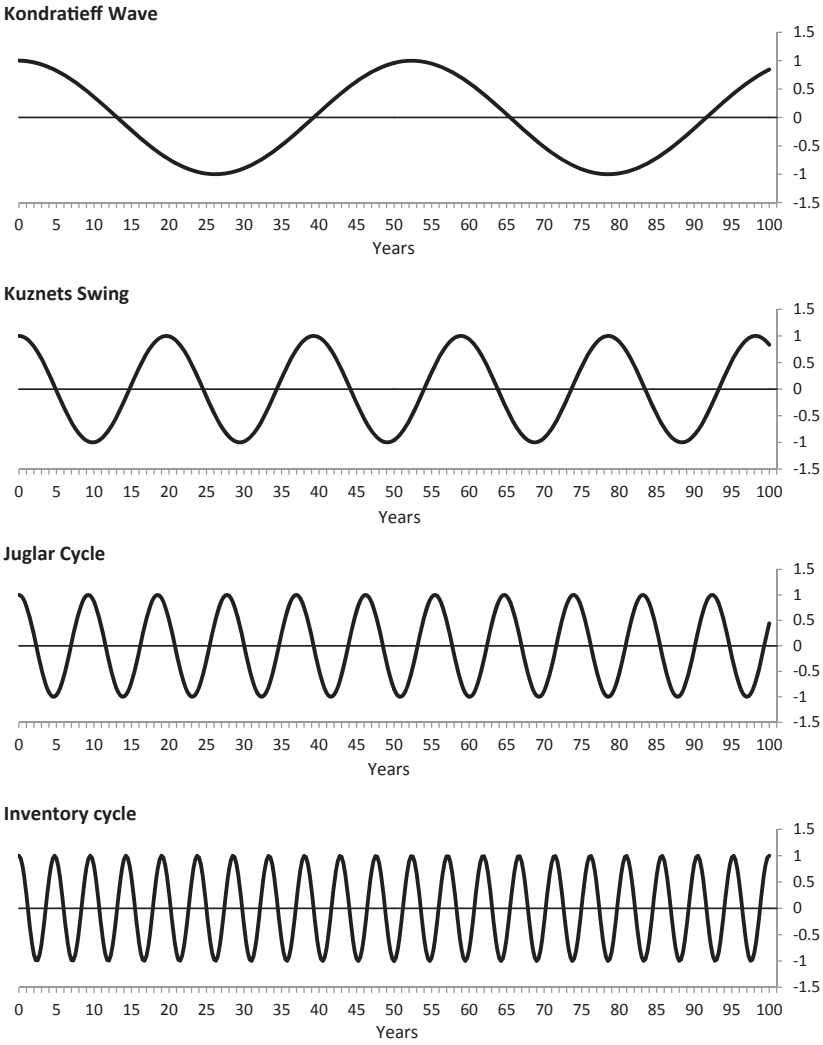

Fig. 2.3 Stylised representation of the classical business cycles dichotomy

A more modern interpretation of this idea is the idea of General Purpose Technologies or GPTs (David 1990) which represent major innovations that have widespread uses which get fulfilled over time. Steam, electricity and information and communications technology (ICT) are examples of

GPTs. Some of these theories argue that the diffusion of a new GPT will initially generate a productivity slowdown in the early phase of the diffusion process, and are only followed by productivity acceleration later. However the evidence supporting the Kondratieff wave as a result of technological improvements and GPTs more generally is mixed. Solomou (1994) however argues that long swings may result from institutional changes, for example the introduction of a gold standard or monetary union.

The different cycles are summarised in Fig. 2.3 using simple deterministic periodic cycles to represent each theory. Schumpeter in his work suggested that the overall cyclical pattern observed was a composite of the different periodic cycles. So for example a Kondratieff wave could consist of two Kuznets swings, which in turn could contain two to three Juglar cycles.

Alongside these classic empirically-based studies which tended to focus on real shocks driving the cycle, other theories of the cycle were being expounded in which money and credit placed a central role.

2.4 Classical Monetary and Credit Cycles

Wicksell (1898) and Austrian Business Cycle theorists such as Hayek (1929 [1933]), von Mises (1934) and Lachmann (1956) were the first to explicitly include money and credit into a narrative about cycles. Wicksell introduced the idea of the natural rate of interest—the rate of interest that would equate planned investment with planned saving in a closed economy (r^* in Fig. 2.4). He showed how, in a monetary economy, the market rate of interest could easily differ from that natural rate setting in motion an unstable cumulative process of higher inflation and lower real interest rates. Shocks to investment and saving might change the natural rate of interest but market rates, pinned down by monetary factors in the short run, might not. He argued that a positive gap between planned investment and planned saving at the market rate of interest could only be filled by money and credit creation by the banking system (over and above any change in the demand for money) which holds the interest rate below the natural rate. This money creation finances an increase in nominal spending, which pushes up output

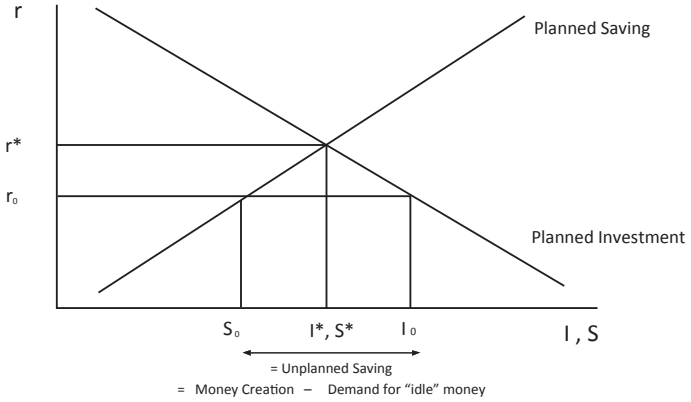

Fig. 2.4 The Wicksellian natural rate and the monetary cycle

and inflation. One could think of the money received by the recipients of the higher level of spending as representing, in the first instance, "unplanned saving" that plugs the gap between investment and spending plans (Fig. 2.4). The resulting adjustment leads to an ever-increasing spiral of higher inflation and lower real interest rates unless market rates are brought in line with the natural rate.

The Austrians developed a similar line of thought but developed it into an explicit theory of cycles during the early C20th. Much of the emphasis of the theory is on monetary policy as the cause of the boost to credit creation by the banking system. This falsely informs producers of a time preference alteration. Consumer time preferences are deemed to be the signals for producers to allocate their production over time. High saving supposedly indicates a preference for future consumption and low current consumption. In an upswing in the cycle expansionary monetary policy, which reduces interest rates relative to the time preference of consumers, distorts that signal. It increases margins on investment, especially for loans with long-term capital structure and results in ill-informed investors favouring long-term investment into their production process, referred to as "malinvestment". This is accommodated by high credit growth and broad money creation. The effect of increased spending by firms does filter through to an increase in

demand; however, this is not sufficient to meet the output expectations on which the finance of the long-term loans depends. As firms begin to default, banks scale back credit and demand repayments resulting in a credit crunch, possible recession and a readjustment period.

Austrian business cycle theory does not cover the exact details of the bust phase, simply that it is inevitable. Von Mises, for example, argued that the ensuing credit crunch involves consumers adjusting their balance of saving and investment; and that the recession is caused by the absorption of losses during the period of monetary boom. The recovery from recession comes as economic activity refocuses on more accurate, sustainable consumer desires. It is acknowledged that the boom can be artificially maintained providing that credit continues to expand. The exact time-frame over which a typical cycle occurs, depends on for how long monetary policy remains loose. However, the longer the credit-fuelled boom continues for, the longer and more severe the readjustment period.

A similar monetary theory of the cycle was developed by the British economist Ralph Hawtrey. He too argued that the trade cycle is driven by changes credit and money creation by the banking system. Hawtrey's theoretical cycle begins with a rise in credit encouraging firms to increase expenditure while credit is typically cheap following a downturn. The increased expenditure filters through to consumers, meaning an increase in household income. Household's increase spending on consumption as their incomes rise, causing a depletion of firms inventories (some of which they are assumed to have paid for with the newly issued, cheap credit). The shortage means prices begin to rise and firms seek further credit to buy factors of production at the new, higher prices. This cycle causes inflation and a growing money supply. Periods of boom come to a sudden and violent halt when banks suspend credit expansion. A slowdown in credit on the other hand sparks a contractionary spiral in the equivalent opposite fashion.

The main feature of these monetary theories is that they view the money supply as endogenous and driven by the decisions of the banking system. The shock that causes banks to increase or decrease credit can be due to monetary policy to the extent it is set different to the

natural rate. But more generally any shock to demand and supply that effects the natural rate of interest can set this process in motion if not perfectly offset by policy or market interest rates. This can include animal spirits and overoptimistic expectations by households and firms or by changes in the lending behaviour of the banking system.

2.5 Modern Theories of the Business Cycle

The experience of the Great Depression of the 1930s and the Keynesian revolution in response to it reset the business cycle research agenda. In particular the role of macroeconomic stabilisation policy to control the cycle and avoid unnecessary swings in output and unemployment came to the forefront. Different views about the drivers of economic cycles and the friction that led to movements in output and unemployment would then determine whether policymakers could do anything to alleviate fluctuations. For example, macroeconomic stabilisation policy offered a way of ending the business cycle completely to the extent cycles reflected shifts in expectations and demand which could be offset by fiscal and monetary policy. Others put more weight on the idea that shocks were fundamentally supply-side driven and that there was little policy could do other than to put in place structural policies that could counter such forces in the longer term. Overall many of the classic theories discussed earlier were reformulated or articulated in a slightly different way to reflect the emphasis on frictions and the role of policy in alleviating them.

2.5.1 The Post-WW2 Keynesian Multiplier-Accelerator View of the Cycle

The Keynesian view of the cycle that emerged in the writings of Keynes and his followers closely resembles some of the ideas in the Kitchin and Juglar cycles. Shocks to aggregate demand, either from consumption, government spending and exports or shifts in investment due to "animal spirits" lead to an initial increase in output and income because

wages and prices are sticky and output is demand-determined. The Keynesian multiplier however would imply that the initial increase in output will lead to future rounds of spending given a non-zero propensity to consumer out of income. If this process is characterised as a lagged relationship between consumption this period and income in the previous period this in itself would imply the response of output to a change in demand will be spread out over several periods. In addition there is the relationship between both inventory and fixed investment with the change in demand and output arising from the desire to restore stock-GDP/sales ratios. These relationships then imply persistent cyclical fluctuations in output and employment. Take the following simple model embodying a propensity to consume out of lagged income, an accelerator term in investment and a stock cycle.

$$Y_t = C_t + \Delta S_t + I_t + \mathrm{NX}_t$$

$$C_t = \pi Y_{t-1}$$

$$I_t = \theta(C_t - C_{t-1})$$

$$\Delta S_t = S_t - S_{t-1}$$

$$S_t = \sigma Y_{t-1}$$

where Y is GDP, C is consumption, S is the level of stocks or inventories, I is fixed investment and NX is net exports (exports—imports).

A shock to net exports (NX) of £100mn and values of $\pi = 0.8$, $\theta = 1$ and $\sigma = 0.2$ in this model will lead to the cycles shown in Fig. 2.2. The multiplier effect will lead to a gradual increase in GDP to £500mn given the marginal propensity to consumer, π, out of each round of income is 0.8, giving a total multiplier of 5 ($=1/(1-0.8)$). Adding an accelerator effect where investment is a function of the change in output leads to a damped cyclical impact over and above the multiplier effect given the value of θ. Adding a simple stockbuilding element where stocks are a function of lagged output leads to a regular cycle pattern around the Keynesian multiplier impact of £500mn under the parameters calibrated above. In general the model above will lead to a second

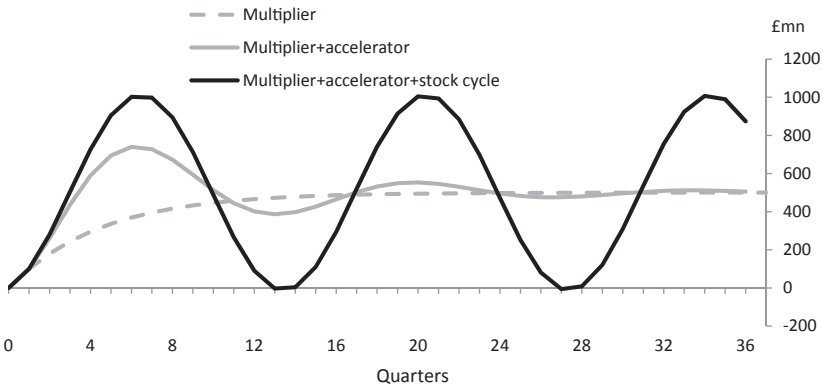

Fig. 2.5 The multiplier-accelerator and stock cycles

order autoregressive or "AR(2)" process for output which can generate damped or unstable cycles under different parameter values as will be discussed later. Figure 2.5 illustrates.

The existence of such cycles suggests a role for macroeconomic stabilisation policy to offset such fluctuations. In the post-war period fiscal policy—either government spending or tax changes—were argued to be the most effective tools to offset such fluctuations. It was recognised however that if stabilisation policy was implemented in a laggardly fashion it could augment rather than offset the business cycle. Moreover fiscal and monetary policies themselves could end up being the drivers of such cycles if they were used in a pro-active fashion to try and boost the economy. For example during the 1950s, 60s and 70s UK governments attempted several times to use fiscal policy to break out of what was perceived to be poor productivity performance compared to other competitor countries. These attempts were based on overoptimistic expectations of how such movements in demand could lead to increases in the economy's supply capacity.

2.5.2 Monetarist and New Classical Monetary Cycles

The emphasis on aggregate demand shocks and sticky wages and prices as a source of fluctuations faced criticism in the 1970s from both monetarists and the new classical macroeconomic revolution (see Hoover 1988).

Monetarists such as Milton Friedman and later new classical economists such as Lucas (1973) placed more emphasis on monetary shocks (unexpected movements in the money supply) as a source of disturbances and placed more weight on the role of expectations and uncertainty about relative price movements rather than sticky prices as the reason such disturbances cause temporary movements in output away from trend. For example, Friedman is usually associated with the idea of adaptive inflation expectations. In Friedman's story an increase in the money supply and nominal spending would lead in the first instance to an unexpected increase in inflation given flexible goods prices. The actual real wage faced by firms would fall incipiently causing firms to demand more workers. This would then start to bid up nominal wages. However because this increase in nominal wages would be perceived as a rise in real wages by workers with adaptive inflation expectations, they would then be prepared to supply more labour in response. The resulting increase in nominal wages would therefore end up being less than the increase in prices, leading to an equilibrium fall in the real wage and higher output and employment.

Friedman and Schwartz (1963, 1982) in their monetary history volumes on the United States and UK used this approach to re-evaluate the role of monetary disturbances in historical economic cycles. Famously they argued that the Great Depression in the United States was mainly the result of the fall in the broad money supply arising from the large number of bank failures. The blame for this was firmly squared at the Federal Reserve for not acting as a lender of last resort.[2]

The new classical monetary approach to business cycles (Lucas 1973, 1975) placed more emphasis on microfounded models and rational expectations. In this case monetary shocks would only cause a very temporary disturbance to output to the extent agents have imperfect information and confuse a change in the general level of prices with a

[2]Often the fall in the money supply is attributed to a fall in the monetary base mentioned in Friedman's (1968) presidential address. Although there was a fall in the monetary base in 1928–1930, the large fall of 33% in M2 between 1930 and 1933 is mainly due to a fall in deposits relative to commercial bank reserves. For a discussion of this see Nelson (2018).

relative price change that causes them to supply more labour or output. However, persistent cycles could be generated if shocks to the money stock were serially correlated and by the added persistence implied by the impact on investment and the capital stock which would ultimately need to be unwound if the money supply shock was neutral on output. These mechanisms are discussed further in Hoover (1988). This results in the Lucas "surprise" supply curve linking output to surprise changes in prices and money. If money growth is assumed to be serially correlated this can be solved out to generate a second order difference equation in output which once simulated produces a persistent response to a monetary shock.

The main issue with the monetary disturbances approach is the articulation of what counts as a monetary disturbance in practice and why they might be serially correlated. Typically the literature uses an exogenous money supply process as a pedagogical device to articulate the theory. In practice the nature of an underlying monetary shock will differ according to the policy regime and the financial structure of the economy. For example, under a gold standard a monetary shock might be associated with a gold discovery at the world level. However for an individual country the money supply is endogenous and would respond to any shock that caused balance of payments to move into deficit. Many of these shocks would be real shocks, e.g. a deficit caused by a poor harvest or some other real shock. Similar issues apply to the fiat money economies of the C20th where many countries implemented monetary policy via setting short-term interest rates. The money supply will endogenously respond to the interest rate rule of the policymaker. Therefore monetary shocks are really deviations from the expected policy rule of the monetary authorities and the persistence of the implied money supply process will depend on the persistence of the interest rate rule and the variables it reacts to. Furthermore there is the distinction between shocks to narrow and broad money. Should shocks to the banking system's willingness to supply credit be thought of as a monetary shock in this framework or a real shock? And if so how does this relate to the Austrian School and Hawtrey narratives for the business cycle discussed earlier which put money creation by banks at the heart of the process. These issues were taken up by many economists in the 1970s and 1980s as the

monetary and fiscal authorities in many countries grappled with monetary targets at the same time as they were liberalising the banking and financial system. This forced the development of a greater understanding of the financial nexus between the central bank, the government and the commercial banking system (see Goodhart and Needham (2017) for an excellent exposition of how this developed in the UK). The most prominent and articulate advocate of how this system has led to broad money cycles in the UK and other countries has been Congdon (1992, 2005) who emphasises the link between broad money, asset prices and nominal spending and how this can explain the business cycles observed since 1970s. Many central banks also emphasise the need to take into account the money creating power of the banking system and the role of monetary and macroprudential policy in ensuring this does not endanger monetary and financial stability (see Mcleay et al. 2014; Jakab and Kumhof 2018).

2.5.3 New Keynesian Business Cycles

The New Keynesian approach to the business cycle developed in the mid-1980s and to some extent represents a synthesis of earlier ideas. The new classical emphasis on microfoundations and rational expectations was combined with an articulation of the key wage and price frictions that ultimately lay behind cyclical movements in output. Imperfect competition was the key to explaining why output was demand-determined. Given prices exceed marginal cost in equilibrium then if prices are sticky in the short run it would be profitable for producers to expand output in the face of a demand shock.

A key feature of the New-Keynesian model was the "divine coincidence". If the economy is hit by either shocks to aggregate demand or supply then stabilising output around trend—where "trend" is strictly the level of output consistent with flexible prices—is also consistent with stabilising inflation. Given the key welfare loss in the model arises from the relative price distortions implied by sticky prices, then stabilising the output gap and inflation was also the optimal prescription for monetary policy. Only shocks to mark-ups,

or other distortions that cause potential supply to move from its "efficient" level, would lead to a trade-off between stabilising output and inflation, and therefore a case for allowing output to move way from its flexible price level. Although this idea had been implicit in earlier descriptions of the cycle the implications for the interpretation of cycles was clear. In the absence of large trade-off inducing shocks then any persistent cycle that emerged must be the result of sub-optimal stabilisation policy. These results can be tempered if other frictions or policy preferences are brought into the mix. For example the perfect stabilisation of output around trend might lead to considerable instrument volatility if the immediate effect of policy was quite small and only came through with a lag. Such volatility in interest rates or distortionary tax rates might have additional welfare implications that might mean it was optimal for policy not to stabilise output fully, at least in the absence of additional policy instruments.

2.5.4 Real Business Cycles

The new classical revolution in economics also produced an alternative theory of business cycles where technology and other supply shocks play a prominent role as the key drivers of business cycles. The movements in real output and employment following such shocks are also equilibrium movements and do not rely on sticky wages and prices. This approach became known as the real business cycle (RBC) theory and was first articulated in the well-known paper by Kydland and Prescott (1982) and developed further in papers such as Long and Plosser (1983) and King and Plosser (1984). The papers showed how key features of the business cycle could be replicated in relatively simple models with capital accumulation and random shocks to technology. Shocks to technology were defined as unexpected shifts in output not explained by movements in capital and labour inputs—and known as the "Solow residual" after Solow (1957). RBC theory also had definitive predictions for how other variables moved over the cycle. For example real product wages should move pro-cyclically with shifts in the marginal product of labour. As King and Plosser (1984) argued money and credit can be brought

into the picture as endogenous reactors to the output and expenditure movements generated by such cycles. Other real rigidities were then brought in to explain why, in the data, employment moved by more and real wages by less than the simple canonical RBC model would predict.

The key issue again is how the technology shocks identified by the theory should be interpreted in practice. Should they be taken literally as random shocks to knowledge or technical progress or are they just indicative of supply shocks more generally, that are observationally equivalent to shifts in output relative to capital and labour inputs. For example, oil price or import price shocks might show up as a fall in output relative to inputs of capital and labour.[3] A key implication however of RBC analysis is that the cycle and trend of a series are likely to be related phenomena i.e. permanent and cyclical movements in output arise from the same underlying technology shocks.

Although supply movements are likely to be driven by shocks to technical progress or the supply of factor inputs, some models predict that demand shocks, if they are persistent and not offset by policy, may also have permanent effects on supply. For example, some of those made unemployed in a downturn may find it increasingly difficult to get a job as the duration of their unemployment status increases. So persistent demand shocks may lead to an increase in the share of the long-term unemployed and may increase the equilibrium or "natural rate" of unemployment. Such models are said to exhibit "hysteresis" (see Blanchard and Summers 1986; Layard and Nickell 1986).

2.5.5 Financial and Credit Cycles

The role of financial factors and credit have long played a part in the theory of business cycles, as we have seen with the discussion of the Austrians' and Hawtrey's theories of the cycle. The issue is whether credit and finance are an intrinsic part of the business cycle or whether a distinct credit or financial cycle exists independently of the business cycle,

[3]Oil/import price increases will lower oil/imported inputs which will cause gross output to fall if there is some substitutability between oil and other factor inputs.

but with the two interacting at key turning points. Below we focus on some of the modern theories of the financial cycle, starting with Minsky (1986) and Kindleberger (1978) before moving on to the recent analysis especially by Claudio Borio and others at the Bank for International Settlements (BIS).

Minsky's "Financial Instability Hypothesis" focuses on the build-up of speculative (and ultimately unstable) credit granted in the upswing of an economic cycle. During stages of stable economic growth, when firms have predictable cash flows that easily cover the financing of credit, they take on liabilities that they can only afford given continued economic prosperity. A point comes where the over-leveraged economy can no longer service its debt, credit will tighten and there will be a downswing or recession until the general economic situation is more robust and then a recovery can begin. Minsky stated

> Every disaster, financial or otherwise, is compounded out of initial displacements or shocks, structural characteristics of the system, and human error. (Minsky 1986)

Minsky sees credit cycles as part of the DNA of a deregulated financial system. The build-up of instability during times of economic boom is inevitable and will recur in a cyclical fashion. The explanation offered as to the reason behind a bust is an "unusual" event or, what has become termed a "Minsky moment", that exposes the shortcomings in the system. Minsky argues that these events receive the majority of the blame for the bust or it is blamed on a simple human error that we can easily correct in the future; whereas, in reality it is the nature of a deregulated financial system. Minsky calls for tighter regulation and discusses the possibility of allowing small, perhaps local crises to happen in order to keep balance sheets stable in the long-term.

Kindleberger's most influential work, *Manias, Panics and Crashes: A History of Financial Crises*, was published in 1978, but re-printed after the dot-com bubble because of its renewed resonance. From the title, manias are described as the result of overly bullish expectations, driven by increased credit creation and resulting in speculative bubbles. The panic stage is characterised by a general movement by agents

into money or liquid assets and away from real or financial assets as they realise the increasing likelihood of a crisis. The crash then comes as banks cease to lend at all and there is a fire sale of assets which forces down prices. It is not until assets become sufficiently affordable and agents begin to return to illiquid assets that a recovery can begin. A central bank or equivalent lender of last resort can convince people that liquidity will be available to meet demand (at some price) in exchange for (or secured on) illiquid assets.

A key concept that Kindleberger refers to is that of "displacement", a process by which an event or series of events cause a change in economic activity. With regard to displacement, Kindleberger argues that consistently positive events can create a sentiment of overconfidence that can be more dangerous than a negative shock such as poor harvests or war. He reaches the conclusion (in agreement with Minsky) that by the time the cycle has reached its peak, it is too late for policymakers. Automatic stabilisers need to be in place to prevent the stage of mania being reached, otherwise once mania is in progress, a bust is almost inevitable.

The relative popularity of Minsky's and Kindleberger's theories has grown significantly since the subprime mortgage crisis and ensuing global recession. In the modern literature, credit (bank and non-bank) is the focus of attention in the analysis of financial cycles and their impact on residential and commercial property prices (e.g. Mian and Sufi 2014). A key turning point in the history of credit cycles is often argued to be the extensive financial deregulation during the 1970s and 1980s which has led to increasing levels of private sector debt burdens most of it secured on property. An extremely influential body of work by Jordà et al. (2016) and Knoll et al. (2017) has examined credit and house prices in developed economies since 1870. They emphasise the break in the behaviour of credit from the 1970s onwards noting the "hockey stick" profile in private sector debt ratios over this period. Minsky's work has also been the basis of modern post-Keynesian analysis of the credit and financial cycle (see Keen 2013; Lavoie 2014).

A variety of methods are used to gauge the state of the credit cycle in the modern literature. Aikman et al. (2013) use the ratio of credit to GDP to demonstrate the credit cycle. Whereas, Drehman et al. (2012) look at credit to the private non-financial sector, the ratio of credit to

GDP, equity prices, residential property prices and an index of aggregate asset prices (this includes residential property, commercial property and equity prices). They do however, conclude that equity prices are an unreliable measure of the financial system and disregard them in the analysis.

One general conclusion made is that there is a stark contrast in the duration of financial cycles and business cycles. Drehman et al. (2012) find that, on average, medium-term business cycles last between 7 and 10 years; whereas, they find medium-term financial cycles to last between 10 and 20 years depending on the degree of regulation in the economy. In addition, they find the amplitude of financial cycles to be greater than business cycles:

> On average, the standard deviation of the frequency-based financial cycle is more than seven times larger than that for the cycle in output at business cycle frequencies. Even when compared to the medium-term cycle in output, the standard deviation is two and a half times larger. (Drehman et al. 2012)

A key debate here is whether macro and micro prudential policies, such as setting capital requirements for financial institutions, can act to dampen financial cycles or at least make the financial sector more resilient to shocks, so that a downturn in the economy is not also associated with a financial crisis and the financial system can keep on providing credit.

2.6 Summary—Impulse, Propagation and Policy Response

Bringing this together we can summarise what theory suggests are likely to be the key impulses that generate business cycles and some of the important propagation mechanisms. Theory would also suggest various policies should be able to act as a stabilising mechanism to dampen

cycles if set appropriately but may act as a destabilising force if not. So those policies arguably need to be added to the taxonomy of impulses and propagation mechanisms suggested by Frisch. This taxonomy is summarised in Table 2.1.

Table 2.1 Impulse, propagation and policy stabilisation

Shocks hitting the economy
• **Aggregate supply shocks**. This could take the form of shocks originating in particular sectors of the economy such as the impact of harvests on agricultural output or technological progress in high tech sectors such as information and communication technology. These can then have broader impact on the aggregate if these sectors are an input into other sectors. Alternatively shocks to supply could involve shocks to the supply of factors of production such as a shift in labour market participation or hours worked
• **Domestic demand shocks** arising from changing consumer preferences or a change in the underlying behaviour of government and its preference for higher or lower taxes and government spending.
• **World demand shocks** reflecting demand for UK products from overseas. Wars and other trade disruptions are likely to be a key source of shocks to the demand for exports
• For a small open economy **terms of trade shocks** are likely to be important disturbances to both the demand and supply side of the economy reflecting changes to the relative prices of important exported and imported commodities such as oil. Again wars may be an important source of these shocks if they result in shortages of key raw materials and supplies
• **Shocks to expectations or "News shocks".** These shocks reflect "animal spirits" and expected increases in expected future productivity and income. These may raise demand even if expectations are overoptimistic and not subsequently validated. That lack of validation may then cause a crash
• **Shocks to uncertainty** may cause households and companies to reduce or delay consumption and investment spending directly. It could however lead to a temporary increase in demand if there is uncertainty about future supplies and stocks are built up in advance. Uncertainty may also affect demand indirectly by affecting risk premia in financial markets which alters the cost of finance for companies and households
• **Shocks originating in the banking system** arising from its willingness to extend credit to the economy will also have an impact on the economy via loan and deposit rates and the broader effects from increasing the money supply

(continued)

Table 2.1 (continued)

Key propagation mechanisms
• **Nominal rigidities** cause movements in nominal spending to affect output in the short run rather than prices. In the simplest case this reflects costs of changing prices "menu costs" or it could relate to sticky "information". Nominal rigidities are what leads output to move away from "trend" although trend has a specific meaning relating to the level of output that would prevail under flexible prices
• **Real rigidities** imply that shocks will amplify the impact of demand and technology shocks on output and employment and there will be less impact on real wages and other relative prices. They may also affect the degree of nominal rigidity by affecting the incentives of firms facing menu costs to change their price
• Various **adjustment costs** are likely to mean that movements in output are persistent or serially correlated in the sense meant by Lucas. For example a combination of capital and investment adjustments costs may imply "hump-shaped" responses of demand to particular shocks which may look like a periodic cycle if positive and negative shocks follow each other
• **Expectations** themselves can act as a propagation mechanism. For example adaptive inflation expectations can lead to destabilising output movements through Wicksell's famous spiral of ever-increasing or decreasing real interest rates. Learning mechanisms may also lead to persistence in outcomes

(continued)

Table 2.1 (continued)

Policy as a stabilisation mechanism
• Prior to modern monetary policy frameworks being developed, **monetary standards** such as the classical gold standard were argued to act as a stabilising mechanism through the price-specie mechanism, where gold flows would move between deficit and surplus countries to restore balance via spending and prices, possibly supported by the behaviour of central banks where they existed
• **Modern day monetary frameworks** envisage central banks following a policy rule of some kind which seeks to stabilise inflation and output. In response to demand shocks optimal policy typically involves stabilising demand around potential and attempting to remove the cycle. However some shocks may imply a trade-off between stabilising inflation and stabilising output
• **Macroprudential policies** may also be used to help mitigate risks building up in particular sectors and make the financial system resilient to shocks
• **Fiscal policy** may also be used for stabilisation purposes and aggregate demand management. For example automatic stabilisers such as unemployment benefits may kick in during a recession to cushion demand, or the government may choose to cut taxes in order to stabilise unemployment. However fiscal policy is subject to implementation and impact lags and may act to destabilise the economy if they are insufficiently nimble. If aggregate demand stabilisation is left to monetary policy, fiscal policy may still provide an important role in stabilising the government's debt and ensure that monetary policy is supported by fiscal actions and does not lead to movements in risk premia or inflation expectations that might undermine the role of monetary policy

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