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# Impulse or Propagation? How the Tides turned in Business Cycle Theory

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**Abstract**
This paper contains a short history of business cycle theory. It is argued that in the course of time the emphasis shifted from a mainly exogenous to a mainly endogenous explanation of the cycle. After the integration of the two approaches in the so-called impulse and propagation theory, the balance kept shifting between an emphasis on endogenous propagation mechanism (Keynesians), the exogenous impulse mechanism (New Classicals) and back again to the propagation mechanism (New Keynesians). The shifts in emphasis in theory are accompanied by changes in the perceived window of opportunity for economic policy.

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**Introduction**

The observation that economic development does not occur smoothly but tends to proceed in jerks and leaps has long fascinated economists. Originally they concentrated on the crisis phenomenon and were inclined to attribute disturbances in the path of economic growth to exceptional circumstances which they assumed to have aroused speculation and reckless behaviour. In the course of the nineteenth century, however, economists became dissatisfied with the interpretation of "*each crisis appearing to be the result of its own separate accident*" (Mills, 1867: 11). Instead they came to designate recurrent periods of prosperity and depression as wavelike movements (Phillips, 1828) or as cycles (Lloyd, 1837; Wade, 1833). They were impressed by the regularity and apparent periodicity of these movements and tended to interpret them as the 'heart-beat' of a living organism. It was expected that the study of this 'heart-beat' would reveal the basic characteristics of the capitalist economy and that it would lead to an understanding of its fundamental laws of motion. This change in interpretation marks the beginning of the theory of the business cycle. Marx for instance stressed the importance of the study of the 'industrial cycle' which he associated with the periodical reproduction of fixed capital (Marx, 1893(1971): 185-186). In his view the cycle was one of the manifestations of the historical limitations of the capitalist mode of production. By its periodical recurrence the crisis would, every time more threateningly, put the entire bourgeois society on trial. Some may dislike the pessimism and determinism of the Marxist view and be suspicious of theoretical constructs related to it. It is however by no means necessary to make doomsday inferences about industrial cycles and diagnose them as pathological. While sticking to the point of view that the study of cyclical movements is necessary because it reveals the characteristic working of the economic mechanism, one can just as well draw more optimistic conclusions. An instance of this is the impulse and propagation theory of the cycle (Aftalion, 1909, 1913; Frisch, 1933; Pigou, 1927) and its present day followers (Blanchard & Fischer, 1989; Blanchard & Quah, 1989; Friedman & Schwartz, 1963; Finn E. Kydland & Prescott, 1982; Long & Plosser, 1983; Lucas, 1975; Romer, 2006). Here cyclical movements are interpreted as manifestations of a mechanism which counterbalances and absorbs the external shocks to which the economy is subjected. They reflect the flexible way in which the economy interacts with its environment. For this school, cyclical movements are not a manifestation of vulnerability or of fatal instability but of vitality and strength. In between these opposing views is a third interpretation which grants that cycles are inextricably bound to the development of a modern economy and that they present a problem in

the sense that they lead to social waste, that is sub-optimal use of scarce resources. The cycles are however not considered an incurable disease. On the basis of a thorough analysis of the mechanism of the cycle, it is possible to develop an effective antidote in the shape of anti cyclical fiscal or monetary policies (Basu & Taylor, 1999; Keynes, 1936; Myrdal, 1939; Tinbergen, 1936; Tobin, 1980, 1996).

Despite all the differences between the various views about the fluctuating patterns of economic development they have one important characteristic in common, namely that they acknowledge the importance of the study of these patterns because of the clues they may provide to the working of the economic mechanism as a whole. This is considered to be the relevance of the study of business cycles and it is this point of view which is the starting point and main concern of this paper.

**From accidents to endogenous factors**

The Classical economists like Adam Smith and David Ricardo conceived the economy as a system that was governed by equilibrating forces that guaranteed that optimal use is made of all available resources. The power of this 'invisible hand' is so strong that equilibrium is the rule rather than the exception. On the basis of this one would expect a rather smooth development of the economy. In actual fact the development of the economy of the time was not smooth at all. In stead it was characterised by substantial fluctuations which gave the impression that equilibrium was manifestly absent. The mainstream economists of the time immunised their position by pronouncing that the apparent irregularities were the effects of external disturbances that hit upon the system that would subsequently quickly revert to equilibrium. Each hick-up was explained by reference to some external factor that was made responsible for it and gave it its name: 'Tulip Mania', '*Kipper- und Wipperzeit*', 'South Sea bubble', 'Melancholy Decay of Credit', 'Mississippi bubble', 'Manchester Panic' etcetera (see Kindleberger, 2000; J. A. Schumpeter, 1939; Wood, 1999).

Accidents can happen and there is always the possibility that some external event will push the economy off its track. The problem is that once such event has run its course, the economy does not immediately revert to its original position. It rather tends to deviate from it in a cumulative fashion. It is precisely this cumulative process and the length of the period in which the economy deviated from its postulated equilibrium position that worried the dissenting economists of the time and for which they tried to give an explanation. Sismondi, for instance, who coined the expression 'commercial crisis' in his book of 1819 (Simonde de Sismondi, 1819),

defined a situation of general glut where the consumption potential of the workers falls short of the supply of goods. The overproduction implies curtailment of production which reduces employment and hence brings down the consumption potential of workers which further intensifies the overproduction. Similar points of view regarding the importance of (components of) aggregate demand and the possibility of a general overproduction may be found in the work of Lauderdale, who worried about the possible effects of a reduction of government spending after the Napoleonic Wars (Lauderdale, 1804) and Malthus, who took issue with Ricardo on the tenability of Say's Law (Malthus, 1820). The principle of the workings of such a cumulative process, the leapfrogging of employment and demand, has survived the ravages of time. In a more sophisticated form it still is a basic ingredient in many modern business cycle theories. But as such it is only part of the story. It is capable of explaining the conditions of crisis, or for that matter, which of the characteristics of the capitalist economy make it prone to economic crisis, and of explaining why it persists, that is why a crisis, once set in, may lead to a cumulative downturn (with the ultimate possibility of a complete breakdown) of the system. The problem is that it does explain a cumulative movement in a downward direction but it cannot explain why the economy time and again recovers from this downfall. Neither can it explain the apparent regularity or periodicity of this movement.

When in the course of the 19th century more statistical material became available, scholars got impressed by the regularity and apparent periodicity of the movements of the economy. In 1862 the French economist Clément Juglar presented an extensive analysis of the available statistical material and suggested that commercial crises would recur periodically. He stressed the cumulative effect of the interaction between economic quantities and defined commercial crisis as one stage in a three phase cycle of prosperity, crisis and depression (*prospérité, crise, liquidation*). He insisted that once started the sequence was driven by an endogenous mechanism wherein each subsequent phase emanates from its predecessor. Juglar's basic weakness was that he did not provide an explanation of the way in which this endogenous mechanism was ignited. Obviously he supposed that some external factor caused a phase of over-optimism which gave rise to an increase in the price level that in turn gave rise to a surge of speculation. So he envisioned an endogenously driven cycle that was periodically renewed by some external impulse in the shape of a sudden price rise[1].

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[1] This view is endorsed by Schumpeter. He considers Juglar's definition as the only adequate explanation of the nature of the cyclical mechanism (J. Schumpeter, 1927). His theory differs

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On the basis of a substantial empirical analysis, William S. Jevons (Jevons, 1875, 1878) advanced a theory of a cyclical movement of the economy based on the periodical occurrence of good harvests which in Jevons's view were precipitated by an 11-years cycle in solar activity (sun spots) [2]. Here again we have a logical sequence driven by an endogenous mechanism of which the basic rhythm is determined by some external factor that acts as the 'metronome' for the movements of the economy at large.

A few years later, Marx introduced an interpretation wherein an endogenous cycle mechanism generates its own impulse for renewal. In his view the industrial cycle is the manifestation of the 'heart beat' of the capitalist economy. The ultimate source of its rhythm must be found in the technical conditions of its reproduction process. The typical feature of modern capitalist production is the extensive use of machinery. According to Marx the stock of fixed capital has a definite life span. A concentration of investment in fixed capital at a certain point in time would therefore produce the concentrated need for replacement investment after the life span of the machinery has passed. Subsequently the original investment impulse is echoed through time to produce a series of impulses for the cyclical mechanism[3].

**Endogenous cycles**

It was the Russian economist Tugan Baranowsky who adopted Marx's analysis of the reproduction process of capital and included the reproduction schemes in his theory of economic crisis. Social production is subdivided into the contributions of different sectors (means of production, consumer goods and luxury goods) which are interdependent in the sense that means of production are a necessary input for all sectors, that consumption goods are necessary for the reproduction of the labour force of all sectors and, together with the luxury goods, for the reproduction of the capitalists themselves. To maintain an undisturbed process of expansion it is required that these different sectors of production develop in step. If not there will be an overproduction in one of the sectors that will lead to a curtailment

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from Juglar's in the sense that he sees (endogenized) innovations as the push factor that gives rise to the renewal of the cycle.

[2] Sometimes Jevons' view is used as an example to ridicule the alleged deterministic character of business cycle theory. It is significant that a notable person as J.M. Keynes commented positively on Jevons' theory and thought of it as an approach to the business cycle problem which was extremely plausible for the period to which Jevons referred (Keynes, 1936: 329).

[3] This echo mechanism is, in a slightly modified form, also used by for instance Aftalion (Aftalion, 1913), Kalecki (Kalecki, 1969), Keynes (Keynes, 1936) and Hicks (Hicks, 1950). The mechanism may be amplified by the inclusion of technical innovations once replacement is due. This is more or less the line with the ideas that have later been advanced by Arthur Spiethof (Spiethoff, 1925).

of production in this sector which through its effect on employment and consumption will spread to the other sectors and lead to a general overproduction. The critical task of any system of social production will be to maintain this proportionality in order to avoid economic crisis.

According to Tugan Baranowsky it is precisely at this point where the capitalist mode of production is bound to have problems. In his view the capitalist mode of production is characterised by two fundamental contradictions:

1. The antagonism between production as a means of satisfying human needs and production as a factor in the creation and accumulation of capital, and,

2. The antagonism between the organisation of production in the individual firm and the anarchy of production in society as a whole.[4]

In view of these contradictions, capitalism will have a difficulty in maintaining the proportionality between sectors. A disproportional division implies a partial overproduction of some commodities, which easily leads to a general glut. Accordingly the two fundamental contradictions of the capitalist mode of production make sure that economic crises become part and parcel of capitalist development.

So Tugan Baranowsky makes the institutional arrangement of capitalism responsible for the occurrence of economic crisis but the next question is how does he explain the recurrence of this phenomenon? In his view the ups and downs of capitalist economy are driven by an endogenous mechanism that explains why an expansionary movement once set in motion will overshoot its equilibrium and produce a crisis. The crisis is the onset of a downturn during which proportionality is restored and in which the preconditions for a new upturn are fulfilled. The mechanism consists of a mixture of monetary and real factors. An upswing is initiated by the availability of free loanable funds which desperately seek for an outlet in productive investment. Once such an outlet is found there will be an increase in the demand for and the production of means of production which creates extra employment and income and consequently an increase in the demand for consumer goods. The increased demand for consumer goods creates an additional derived demand for means of production. Because the production of means of production takes time (gestation period), the growth of the production of consumption goods and hence the derived demand for means of production outruns actual production of means of production. It is this leapfrogging between the means of production sector and de consumer goods sector which determines the path of the upswing. This process, however, can not go on for ever. During expansion the reservoir of free loanable

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[4] See also Friedrich Engels 1882 (Engels, 1882 (1973): 227).

funds is gradually used up and the financing of investment encounters an upper limit. The boom is so to speak asphyxiated by the shortage of financial funds. The boom peters out but because the production of means of production cannot be stopped immediately (because of its gestation period) a disproportionality, an overproduction of means of production, occurs. This partial overproduction develops into a general overproduction and a downswing develops. The leapfrogging mechanism is put into reverse and the activity level drops. During the downswing there are two factors at work that prepare the stage for the next upswing. Firstly, because the rate of investment decreases faster than the rate of accumulation of funds, the reservoir of loanable funds is replenished. Secondly, because the reduction in the activity level of the means of production sector tends to be stronger than the reduction in consumer goods production, the proportionality between sectors is restored. With the correct proportions between sectors restored and the pressure from investment seeking funds building up, the upturn is only a matter of time.

Tugan Baranowsky thus demonstrates that economic crises are recurrent by creating an endogenous theory of the industrial cycle. He compares the fluctuating economy to a steam engine. The loanable funds play the role of steam. The pressure of the steam sets the piston in motion and pushes it to the end of the cylinder. Here the steam escapes and the piston returns to its former position. By analogy the loanable funds set the economy in motion and once they are exhausted the economy returns to its former position where the same sequence starts all over again.

By his construct, Tugan Baranowsky accomplishes two things. First he demonstrates that the economic crisis is not a twist of fate that results from factors outside the realm of the economy but that it is intimately connected to the institutional structure of the capitalist mode of production. Secondly he demonstrates that this crisis is nothing but a fleeting moment in a definite succession of phases, the persistence of which gives it the appearance of a cycle. Once set in motion, it will repeat itself in a similar fashion until the end of time.

Tugan Barnowsky's book which appeared on the brink of the 20th century[5] was very influential for European business cycle theory. It was a principal source of inspiration for Wicksel, Spiethof, Schumpeter, Cassel and Aftalion and it can be linked to the work of Clark in the USA and in the UK to Pigou and to Keynes. The latter commented: "*I find myself in strong sympathy with the school of writers [...] of which Tugan Baranowsky was the first and most original*". This does not imply that it

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[5]  The Russian edition appeared in 1894 and was followed by a German translation in 1901 and a French translation in 1913. A partial English translation is contained in Zarembka, 2003 (Zarembka, 2003).

is all in Tugan Baranowsky but he certainly started a new way of thinking about economic dynamics that has kept its relevance to the present day. There are two principal elements contained in his analysis that prove to be strategic in many variants of business cycle theory:

- The first has to do with the cumulative process wherein demand, output, employment, income, and consumption interact to produce derived demand, derived output etcetera. It was described by Tugan Baranowsky in terms of the interdependence of sectoral demands. It was later more precisely formalised by Kahn and Keynes (Kahn, 1931; Keynes, 1936) and became known as the macroeconomic multiplier.

- The second has to do with the interconnection between the demand for means of production (fixed capital goods) and (changes) in the level of output. This also is a cumulative process but it qualitatively differs from the above mentioned multiplier process because of the effects of the longevity of fixed capital items and of the existence of a gestation period for producing them. Longevity explains the empirical fact that fluctuations in the producer goods industry are stronger than the corresponding fluctuations in the consumer goods industries. The existence of a gestation period explains how decisions of the past play a direct role in present day productive activity. It was used by Tugan Baranowsky and Spiethoff (Spiethoff, 1925; Tugan-Baranowsky, 1901) to explain the incidence and subsequent disappearance of disproportionality between sectors. Through the work of Aftalion, Cassel, Pigou and Clark (Aftalion, 1913; Cassel, 1932; Clark, 1917; Pigou, 1927) it became known as the macroeconomic accelerator.

**The Keynesian connection**

The two earlier mentioned cumulative processes and the implied time lags taken together form a mixture that appears to have explosive tendencies. Paul Samuelson however demonstrated that the dynamics of this mixture depend on the magnitude of the parameters of the processes involved. In his famous article published in 1939 he presents a small macroeconomic model containing interaction between the multiplier and accelerator processes (Samuelson, 1939). It consists of three equations: A consumption function, an investment function and an equilibrium condition. In its reduced form, the model consists of a second degree difference equation of which the dynamic properties can be precisely determined on the basis of the magnitude of the parameters involved. The dynamic properties corresponding to various constellations of parameters can be read from figure 1 below.
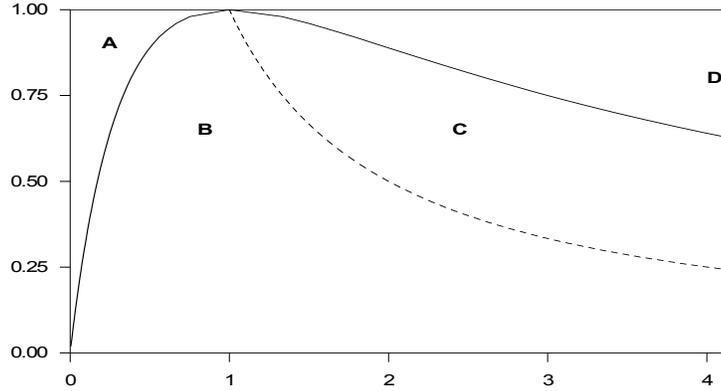
**Figure 1:** Diagram showing boundaries of regions yielding different qualitative behaviour (Adapted from Samuelson, 1939: 78. Vertical axis: $\alpha$ = marginal propensity to consume. Horizontal axis: $\beta$ = accelerator coefficient)

With low values of the propensity to consume ($\alpha$) and especially of the accelerator coefficient ($\beta$) as in region A, the economy will smoothly convergence to its equilibrium position after an initial disturbance. For higher values of (particularly) the accelerator coefficient as in region D, an initial disturbance will cause an explosive movement away from equilibrium in an upward or downward direction depending on the sign of the initial disturbance. Intermediate values of the parameters will produce a cyclical process that may come in the three variants that can be seen from figure 1. Combinations of parameter values in region B of figure 1 produce a damped cycle wherein the amplitude of the cyclical deviation from the equilibrium dies down in the course of time. Combinations in region C will produce the opposite: an explosive cycle wherein the deviation from equilibrium increases with time. On the borderline between B and C the damping and explosive tendencies exactly cancel out thus producing a sinus function with constant amplitude.

Provided that a characteristic of an endogenous cycle is that, once started, it keeps repeating itself endlessly, only the constellation of parameters on the borderline B/C (where $\alpha=1/\beta$, that is where the propensity to consume exactly equals to the inverse of the accelerator coefficient) produces a cycle of the requested type. The damped cycle of region B will evaporate in the course of time, whereas the economic system will break down under the influence of the ever increasing amplitude of the explosive cycle of region C. This doesn't bode well for the endogenous cycle hypothesis since it then has to rely on very special assumptions

regarding a constellation of parameters which will hardly ever be realised in actual practice. There seem to be two ways out of this problem. Either one adds a constraining factor that keeps the explosive tendencies of the C-type cycle type in check, or one adds an impulse factor that rekindles the B-type cycle once in a while to prevent it from dying down.

John Hicks, who considered the damped cycle as being inconsistent with historical experience, chose the first option. He introduced a variation of the multiplier/accelerator model based on the proposition that in reality the value of the accelerator is so high that it produces an explosive cycle. But since historical experience also teaches that the system breakdown that is connected with an explosive cycle did not occur either, there must be a factor that keeps the cycle from breaking outside certain limits. In that case: "*the system might then continue periodically breaking its head against these limits without running away altogether*" (Hicks, 1950: 92). He assumes that there is an upper limit (a ceiling) to output in the form of limited availability of employable resources (labour supply for instance). Although there is no direct lower limit to output, Hicks assumption that the accelerator works differently in the downswing provides an indirect check on the decrease in output that will ultimately become effective. Under these conditions an explosive cycle can develop freely as long as its amplitude is lower than the distance between the ceiling and the equilibrium output level. Given the explosive properties of the cycle, however, output will ultimately hit the ceiling. The pace of growth of the upswing can not be maintained. It is forced down to the growth rate of employable resources. Since this rate is lower than the upswing rate, the fall in output growth causes a drop of investment which triggers the downturn that will last until the reduction of productive capacity is no longer sufficient to produce the current level of output. The necessary increase in investment then sets the new upswing in motion.

**The econometricians: Exogenous impulse and endogenous propagation**
Hicks view of an explosive cycle that is kept under control by a direct upper limit and an indirect lower limit is one possible solution of the endogenous cycle problem. Another way out is through keeping the damped cycle mechanism intact and add an impulse mechanism to it. In this case the damped cycle mechanism is the manifestation of the response of the economy to the impact of external shocks. It absorbs the displacement by fluctuating back to its equilibrium position analogous to the way in which a pendulum returns to its original position after being pushed away from it.

The standard criticism to the exogenous impulse explanation of economic

fluctuations is that the external impulses occur randomly in an irregular fashion. In view of this one should expect that economic time series bear the signs of this by exhibiting a rather erratic pattern. In practice however it appears that the economy tends to fluctuate rather regularly without clear traces of the irregularities reminiscent of the triggering process. One should however make a clear distinction between the impulse and the response mechanism. The first has something to say about the external factors impinging on the system. The second gives the response of the system that is indicative of its structure. Wicksel put it as follows: '*If you hit a rocking horse with a stick, the movement of the horse will be very different from that of the stick*' (Knut Wicksel, 1907). The challenge of explaining how a sequence of random shocks can be transformed into a rather smooth cyclical fluctuation was taken up by Eugen Slutzky in 1927 (Slutzky, 1927, 1937)[6]. He put a long series of winning numbers of the Russian State lottery in a row and created a new series consisting of moving sums of 10 consecutive digits (so he added digits 1-10, 2-11, 3-12 etcetera). As such the digits form a series of unrelated random numbers which does not present a particular pattern. If they are transformed into the series of moving sums, however, consecutive numbers are serially correlated[7] and appear to follow a particular pattern. Slutzky then demonstrated that the fluctuations in his series of moving sums bear a striking resemblance to the movements in an index of English business cycles (Slutzky, 1937: 110). This might indicate that the movements in the English business cycles are of the same origin as the fluctuations in the moving sum series. They might both be the result of applying a linear operator to a series of random numbers.

This idea is taken up by Ragnar Frisch who argues that business cycle theory is confronted with two main problems (Frisch, 1933: 171). The first is the so-called propagation problem that is the difficulty of explaining the structural properties of a given economic system and the characteristics of the swings they generate once it is set in motion (the shape and the characteristic motions of the rocking horse in Wicksel's metaphor). The second is the impulse problem, the difficulty of identifying the factors that propel the system and keep it moving (the hitting with a stick that keeps the rocking horse in motion). To answer these questions Frisch sets out to create a macro dynamic model capable of explaining the basic movements of the economy. In its simplest form it is expressed as a system of two equations in two

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[6] The same year a similar analysis was published by Yule, which however did not focus on economic fluctuations (Yule, 1927).

[7] Each number in the series has the sum of 9 digits in common with the previous one, so the difference between them can at most be equal to nine. The difference between non-adjacent numbers, however, can be much larger.

unknowns (consumption and production). This gives a reduced form equation in the shape of a single variable linear differential equation which produces a secular trend but no fluctuations. Next he introduces Aftalion's gestation period of capital to create the possibility for oscillations. The gestation period introduces persistence in the system because it implies that today's activity is affected by decisions in the past.

To study the nature of the solutions to the resulting mixed system of difference and differential equations, Frisch inserts plausible values for its parameters and calculates the time pattern of development starting from an arbitrary set of initial conditions. Now the system generates on top of the earlier mentioned secular trend three distinct cycle types of which the duration mainly depends upon the parameter *epsilon* that is determined by the length of the gestation period of capital. It can be demonstrated that this system is capable of generating cyclical fluctuations. It appears, however, that with the given set of plausible parameters the swings tend to die down in the course of time. According to Frisch this is generally not the case in reality, so he also sees himself confronted with the earlier mentioned endogenous cycle dilemma already addressed by Hicks (Hicks, 1950: 90 ff). His model only explains the propagation process, but the impulse problem remains. In his view this could be solved by following Knut Wicksel's hypothesis that erratic shocks provide the energy which maintains economic cycles (Frisch, 1933: 30). To demonstrate how this could be explained he simplifies his model by assuming that it behaves as a swinging pendulum. It is known that its oscillations will gradually die down and the pendulum will again come to rest in its equilibrium position. Frisch then calculates the path of the pendulum when it is subjected to a sequence of erratic shocks of various strengths exerted in both directions. Next he shows that the ordinate of the pendulum at any moment will be a weighted cumulation of the effects of passed shocks. The system of weights is determined by the properties of the pendulum itself. Simulation shows that the shape of the curve is a distorted harmonic with the same frequency as the one that is typical of the pendulum. The result again bears a striking resemblance to the fluctuating patterns that are typical of economic time series. In the example the pendulum is just a metaphor for the economic system itself that is assumed to have similar properties. Accordingly Frisch concludes that: "*by connecting the two ideas: (1) the continuous solution of a determinate dynamic system and (2) the discontinuous shocks intervening and supplying the energy that may maintain the swings*" (Frisch, 1933: 34) we can provide an explication for the familiar patterns discernible in economic time series.

**Policy**

Although the 'pure'[8] endogenous cycle theory and the impulse and propagation theory of the cycle provided quite different answers to the 'endogeneity problem', their central tenets can, in a technical sense[9], easily be reconciled. The protagonists of the endogenous cycle theory don't have a difficulty in accepting that exogenous factors do interfere with the basic oscillating pattern in a random fashion, whereas the impulse and propagation theorists readily accept that there is an internal mechanism that absorbs such external shocks by fluctuating around its equilibrium level, just like the tree that bends over and springs back to surmount the forces of wind. The consensus is that there is an oscillating mechanism that is characteristic of a modern economy and that can be known. If the mechanism is known it is possible to assess how it will react to a certain disturbance. On the basis of this knowledge one could possibly conduct economic policy if one could identify external impulses and if one would be able to give (counter)impulses oneself. In the era of the Great Depression, which coincided with the heydays of business cycle theory and with the period wherein the economic profession gradually came to the conclusion that the stability of the economy could not be "*safely left in private hands*" (Keynes, 1936: 320) this idea was further elaborated.

In stead of the simple theoretical models that, fed with plausible values for their parameters produced reasonable mimics of true world business cycles, the objective became to design macroeconomic models that capture the basic properties of the actual economy. By filling it with statistical estimates of the parameters it would then be possible to simulate the behaviour of the economy and to analyze the impact of external impulses. Building on the same type of impulse and propagation ideas as Ragnar Frisch, Jan Tinbergen was the first to build such a model (Tinbergen, 1936) thus setting the first step in what became standard practice in many countries around the world. Such a model can be used as a means of making predictions of how the future development of the economy will be. It can also be used to simulate how the economy will respond to external shocks. If one knows how the system responds to shocks one may on the basis of the same model try to stabilize the effects of a major shock by giving it a (series of) policy shocks as an antidote to the cyclical response to

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[8]  Note that even the purest endogenous cycle needs at least one initial impulse to get started. It is like the 'original sin' that was necessary to start history in the 'vale of tears'.

[9]  With respect to content there is a clear distinction. To lay it on thick, the endogenous theory sees the business cycle as a 'desease' that should be cured by changing the system or by keeping it under control in order to mitigate its negative effects. The impulse and propagation theory rather sees the business cycle as the economy's way of absorbing external shocks, a healing mechanism that occasionally needs some small adjustments to act promptly and run smoothly.

the disturbance. Similarly, the macroeconomic model might be used as a means of uncovering the basic weaknesses of the system that are responsible for excessive instability and to determine whether they can be remedied by the appropriate policy measures.

The period after the Second World War witnessed the establishment of many planning agencies that built large scale macroeconometric models of national economies, or even of the world economy at large, that formed the basis for the prediction of future development and as a guide for the creation of impulse time-tables for economic policy. In this 'optimal control' view, the economy was considered a sort of engine with a known mode of operation that could be adjusted by turning the appropriate knobs of its control panel. In this way the economy could be steered in a certain direction and its fluctuations could be mitigated by an explicit anti cyclical policy. The models were mainly built around one or the other version of Hicks's interpretation of the Keynesian system (i.e. the open economy version of IS/LM Hicks, 1937; Fleming, 1962 (2002); Mundell, 1963 (1992)) and were strongly demand oriented. Impulses where assumed to be random demand impulses in the exogenous variables that could be countered by an exactly pointed burst of policy measures in order to stabilize their effects.

According to the standard setup of the pendulum model, three types of factors are involved in the actual functioning economy. First is the type of exogenous factors that impinge upon the economic mechanism and that follow an erratic random process. Second is the set of interacting endogenous factors that represent the internal workings of the economic mechanism and that form the heart of the econometric model. They generate the oscillations of the system and thus assume the role that the pendulum plays in Frisch's example. Thirdly there is the category of policy variables, a set of monetary and fiscal instruments that is used by the governing institution to stabilize the cycles.

The big question, however, is whether a given macroeconometric model is capable of adequately reproducing the cyclical behaviour of a modern economy. This is the issue taken up by Irma and Frank Adelman with their analysis of the dynamic properties of the well-known Klein-Goldberger model for the USA (Adelman & Adelman, 1959). On first inspection of their simulation experiment they find that there is no "*hint whatever of any internally generated business cycle, and, indeed, even in the first few years, the shock of start-up is not sufficient to induce more than a single turning point in any variable*" (Adelman & Adelman, 1959: 602). If one wishes to maintain that cyclical movements are self-generated one might have to conclude that the Klein-Goldberger model is totally inadequate unless one is prepared to look

elsewhere for the origin of the factors fuelling business fluctuations. This is precisely what the Adelmans intend to do. They follow the path set out by Slutzky, Frisch and Tinbergen and explore the sensitivity of the Klein-Goldberger model to the impact of random disturbances. They distinguish two types of shocks. Type I is the sequence of random disturbances exerted on the exogenous variables of the model as in the standard setup of the impulse and propagation model. Type II is a random process in the error term that is added to each individual equation of the model itself. Simulations reveal that the Klein-Goldberger model driven by a type I random process exhibits cyclical behaviour comparable to the real world cycles of the US economy be it that their amplitudes are much smaller than the actual values. The performance of Klein-Goldberger driven by type II errors is much better. After assessing the results by means of the NBER method of measuring business cycles (see Burns & Mitchell, 1946) it becomes obvious that the model produces cycles that are very similar in respect to their average length, the duration of expansions and contractions, the degree of clustering of peaks and troughs, the proportion of specific cycles that are leading or lagging, and their indices of conformity to that of the empirical material for the USA.

All this seems to underpin the conclusions of the pendulum model. But in fact the Adelman conclusions imply two types of change. The first is that the range of possible perturbations is greatly enlarged because now it is not only the exogenous variables but also the endogenous variables that are affected by chance. The second is that, precisely because the endogenous factors are affected by external disturbances, the relations and interaction patterns between the endogenous variables also change. The model no longer mechanically turns out the same results and no longer responds to policy stimuli in the same fashion. Its mode of operation changes because the proportions within the system change under the impact of external influences. The upshot of all of this is that the assessment of the relative importance of the impulse system increases to the detriment of that of the propagation system[10] and that the estimated power of economic policy diminishes because it has to be implemented in a more complex environment.

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[10] Irma Adelman seems to be undecided on this issue. In a sequel to the original Adeleman-Adelman paper, she appears to give priority to the impulse mechanism (Adelman, 1960). In her reply to Coppock's criticism (Coppock, 1962), however, she appears to favour the propagation mechanism again (Adelman, 1962).

**Turning tides**

Granted that the relative importance of the impulse mechanism increased, the decade following the Adelman paper witnessed a discussion focusing on the question which type of impulses were more prominent, which part of the transmission within the propagation mechanism was the strongest and which type of economic policy was the most effective. The mainstream (fiscalist) Keynesians mainly held real demand factors responsible for economic fluctuations and regarded, because of the magnitude of the corresponding multipliers, fiscal policy as the most effective instrument for stabilizing them. This interpretation was challenged by Milton Friedman who turned the fiscalist Keynesian view upside down. In his analysis monetary factors rate highest among the impulses, monetary transmission is the dominant propagation mechanism and because the monetary multipliers are the largest, monetary policy is a more powerful tool (as in Friedman & Meiselman, 1963; Friedman & Schwartz, 1963). He, however, immediately adds that discretionary monetary policy should not be tried. Due to long and variable time lags it is impossible to ensure that the impact of monetary policy measures arrives at the right moment and it may turn out that monetary policy in the end is pro-cyclical in stead of anti-cyclical (Friedman, 1948). He even goes as far as claiming that much of the observed fluctuations must be attributed to misdirected monetary policy actions. For this reason he suggested that monetary authorities should follow a fixed monetary rule that accommodates the process of economic growth in stead of interfering with it.

Notwithstanding the differences of opinion with regard to the effectiveness of economic policy and the different emphasis on the impact of fiscal and monetary policy measures, the Keynesian mainstream and Monetarism had much in common. They used the same short run model (Mundel Fleming extension of IS/LM) the main difference being the emphasis on real versus monetary factors and the fact that the Keynesians tend to explain cyclical persistence with reference to wage and price rigidities, whereas Monetarist tend to explain persistence by money illusion and the slow adjustment of price expectations (adaptive expectations).

The balance of power between Keynesian and Monetarist economists tipped in favour of the last mentioned in the course of the 1970's. One of the central tenets of Keynesian economic policy making, the Phillips curve, came under attack (Friedman, 1968; Phelps, 1968). After the Oil shock of 1973 - a 'supply shock' that is alien to the Keynesian focus on 'demand shocks' - it appeared that Keynesianism could no longer explain the problems of the time because it lacked an adequate theory of inflation. The replacement of the adaptive expectations rule with the rational

expectations hypothesis led to the policy ineffectiveness proposition which maintains that economic policy is actually impossible because rational economic agents anticipate the effect of economic policy and adjust so as to neutralize it (Sargent & Wallace, 1975, 1976). Robert Lucas launched his critique of the optimal control theory that lay at the root of large scale econometric model building in the Keynesian tradition. He thought that the assumption that the parameters of the model remain the same when there is a change in policy can not be maintained when expectation formation is rational. Rational agents will adjust to policy changes by changing their behaviour which in turn changes the mode of operation of the model itself (Lucas, 1976). Rational expectations together with the assumptions regarding the intertemporal substitution of labour leaves only room for the impact of external causes when they are not anticipated. In Lucas's equilibrium 'monetary surprise' theory of the business cycle, the economy only deviates from equilibrium when an unexpected external disturbance occurs. Likewise, a monetary shock administered by the monetary authorities to stabilize the economy only has a real effect when it takes the private sector by surprise. Lucas's theory (sometimes referred to as Monetarism mark II, or New-Classical Theory mark I) is similar to Friedman's in the sense that it is driven by monetary shocks and is equipped with strong equilibrium tendencies. The main difference is that the range of shocks with real effects is limited to unanticipated ones and the persistence of cycles is reduced because rational expectations imply a much shorter adjustment process after a disturbance. Moreover, the assumption of an underlying pendulum process is given up altogether(Chatterjee, 2000).

In spite of the sometimes fierce debates between Keynesians, Monetarists and (type I) New-Classicals there was a basic consensus on a number of important points (Snowdon & Vane, 2005: 330). First, they all considered business cycles as temporary deviations from a smooth underlying trend (this is the trend stationarity hypothesis. Compare (Blanchard & Fischer, 1989: 12)). Second, all considered economic fluctuations socially undesirable because they reduced economic welfare, and third they all considered monetary factors to be important for explaining business cycles. These pillars of consensus were, however, demolished in the course of the 1980s with the rise of a different brand of New-Classical theories which come under the title 'Real Business Cycle Theory (RBC)' (Hartley, Hoover, & Salyer, 1998; Finn E. Kydland & Prescott, 1982; Long & Plosser, 1983; Prescott, 1986). The adjective 'real' is added because the protagonists of this school consider money as super neutral. Monetary impulses lead to immediate price adjustments and hence have no real effects. The economy only responds to supply shocks (changes in production

technology, changes in the environment, energy crises, war and political upheaval, labour unrest, and government regulations which damage incentives) of which productivity shocks are the most prominent. Because RBC theory wants to integrate the theory of fluctuations into the theory of economic growth, they consider the business cycle an anathema. In their view there is no distinction between trend (the locus of equilibrium) and cycles (the deviation of actual values from equilibrium). Every supply shock dislocates the equilibrium itself and has a permanent effect. There is no such thing as a trend plus cycles, the upward tending and fluctuating pattern that is observed in economic time series is nothing but a random walk with drift (Nelson & Plosser, 1982). The RBC world is populated with representative agents, rationally expecting intertemporal utility maximizers, which are sensitive to changes in real wages and real interest rates. An increase in labour productivity leads to an upward shift of labour demand. The concomitant increase in real wages is an incentive for the representative agent to increase her labour supply. She substitutes present working hours for future leisure, 'makes hay when the sun shines' if the shock is considered transitory or completely readjusts her assets and activity portfolio if the shock is considered permanent. According to the RBC theorists, intertemporal substitution is a powerful propagation mechanism[11]. It is, however, not the only one. Consumption smoothing and the gestation period of fixed capital ('time to build' Finn E. Kydland & Prescott, 1982)) are also factors that carry forward the impacts of initial impulses.

RBC theorists consider the Solow residual - the part of the growth process that can not be explained by the change of factor inputs - as the principal indicator of technological change. They then demonstrate that feeding this residual to a calibrated[12] version of the RBC-model results in patterns that strongly resemble the ones that are present in some important time series data relating to the US economy (Plosser, 1989). So here again, we have a version of the impulse and propagation model of the business cycle that is capable of mimicking the behaviour of an actual economy. But there is an important difference with the older versions of the impulse and propagation approach. The RBC model is an equilibrium model that does not represent the way in which the economy finds its way back to an equilibrium position

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[11] This assertion is contested by Cogley and Nason who claim that "Many RBC-models have very weak internal propagation mechanisms and do not generate interesting dynamics via their internal structure. […] output dynamics are nearly the same as input dynamics" (Cogley & Nason, 1995: 509).

[12] Calibration is not simply filling in plausible values for the model parameters like for instance Frisch did (Frisch, 1933). Cooly defines calibration as "a strategy for finding numerical values for the parameters of artificial economies" that involves a "symbiotic relationship between theory and measurement" (Cooley, 1997).

but rather the way in which an economy moves under the impulse of an external force while constantly remaining in equilibrium. The upshot of this is a completely different view of the role of economic policy. According to RBC theory the movements of the economy are just the result of rational economic agents responding in an optimal way to changes in the environment. On this view markets always clear and accordingly observed fluctuations can not be interpreted as socially undesirable deviations from an ideal growth path of output. They are considered to represent Pareto-optimal equilibrium positions. The idea that government would try to reduce them would certainly lead to an undesirable reduction of welfare. Prescott put this as follows: "*the policy implication of this research is that costly efforts at stabilization are likely to be counter-productive. Economic fluctuations are optimal responses to uncertainty in the rate of technological progress*". On this view it appears that the business cycle no longer presents a problem.

**Resuscitating Business Cycle Theory**

As far as business cycles are concerned it seemed as if mainstream economic theory had definitely reverted to its original 19th century position. The omnipresent equilibrium pushed out the business cycle and relegated it to the domain of the type of essentially exogenous processes that are beyond the reach of economic policy. However, as so often in the history of economic thought it was economic reality itself that turned the tables on RBC-theory. The equilibrium explanations of the business cycle were called into question by the recessions of the early 1980s and 1990s and the persistence of unemployment particularly in Europe in the same period (Arestis & Sawyer, 1998; Snowdon & Vane, 2005: 359; Tobin, 1992). It proved impossible to square the observation of sustained double digit unemployment rates with RBC's notion of full employment equilibrium and the corresponding conception of 'voluntary unemployment' resulting from rational economic agents' choice to substitute work for leisure. They should rather be seen as the expression of involuntary unemployment that is attached to macroeconomic instability resulting from aggregate demand disturbances. In other words the persistence of high unemployment indicates that there are prolonged periods wherein the economy can be off its full employment equilibrium. Accordingly the facts indicate that there is scope for a return to the earlier mentioned Keynesian/Monetarist consensus that economic development can deviate from its equilibrium trend, that these deviations are socially undesirable and that there is scope for government intervention to improve macroeconomic stability and economic welfare.

The new interpretation, dubbed New Keynesian economics, builds on RBC-theory in the sense that it accepts several of its methodological premises. It agrees that macroeconomic theories require solid micro foundations, that choices are guided by rational expectations and that the general equilibrium framework is best suited for macroeconomic model building. New Keynesians also accept that supply shocks are important determinants of macroeconomic dynamics. They immediately add, however, that demand shocks are as important, particularly so because they define the deviations from (supply-determined) path of equilibrium (Blanchard & Fischer, 1989; Blanchard & Quah, 1989, 1993)

The essential difference between RBC- and New Keynesian theories relates to their interpretation of the micro foundations of macroeconomics. RBC refers to a notional system of instantaneous adjustment within a full information perfect competition economy with a complete set of markets. They presuppose that all markets clear and hence take the existence of equilibrium for granted. On the other hand New Keynesian theory refers to a real economy that is riddled with imperfections that slow down the adjustment process so as to create prolonged periods of deviation from equilibrium. The main focus of New Keynesian theorizing is on imperfections in financial markets (Greenwald & Stiglitz, 1993), goods markets (Akerlof & Yellen, 1985; Greenwald & Stiglitz, 1991; Mankiw, 1985; Parkin, 1986; Stiglitz, 1999) and labour markets (Akerlof & Yellen, 1986; Fischer, 1977; Katz, 1986, 1988; Taylor, 1980; A. Weiss, 1990; L. Weiss, 1986; Yellen, 1984) that lead to wage/price rigidities which hamper the operation of equilibrating forces and thus create the possibility for sustained deviations from equilibrium. In this way they reintroduce the typical response time that on the one hand explains why the effect of demand shocks tends to persist and on the other hand creates a window of opportunity for macroeconomic policy.

The New Keynesians again turn the attention to the propagation mechanism inherent in the economic system itself. Persistence is not a property of the impulse mechanism as in RBC-theory (Cogley & Nason, 1995) but rather a consequence of the propagation mechanism that carries the effects of shocks through time. In this way the New Keynesians again shift the relative weight from exogenous impulses to the endogenous propagation mechanisms that are at the heart of business cycles. In doing so they also demonstrate that there is scope for macroeconomic policy: The stretch of time in which the economy is off its full employment equilibrium is considered a loss to society (also see Basu & Taylor, 1999; Zarnowitz, 1998, 1999). As far as economic policy can mitigate such losses or shorten the period wherein these are incurred, it must be considered a blessing to society. This does, however,

not imply that the clock is turned back to the euphoria of the 1960s and the early 1970s. The window of opportunity for economic policy is considered to be much smaller than before. The expected number of complications has increased considerably. Firstly, if the economy is assumed to be affected jointly by demand shocks (with a transitory effect) and supply shocks (with a permanent effect), economic policy making is like aiming at an erratically moving target. Stabilizing the effect of a demand shock becomes more difficult when equilibrium is randomly shifted due to supply shocks. Secondly, the assumption of rational expectations implies that the adjustment process is much faster. Accordingly the time frame for policy intervention is much smaller. Thirdly, the assumption of rational expectations implies that policy shocks only have a real effect if they are unforeseen. Under these conditions economic policy making becomes a strategic game in which the monetary and fiscal authorities can only be successful if they take private agents (who do the utmost to try and predict such policy actions) by surprise (Blackburn, 1987; Finn E Kydland & Prescott, 1977). Fourthly, in view of the uncertainties surrounding the movements of the economy and the existence of inside and outside time lags that delay the impact of policy actions it may well be that economic policy is in effect destabilizing rather than stabilizing. 'Fine tuning' the economy may thus be an illusion so that one has to restrict oneself to, what Lindberg referred to as 'coarse tuning', policies designed to counteract or circumvent serious macroeconomic problems (Lindbeck, 1992: 231).

**Summary and conclusion**

In this paper the development of business cycle theory is presented as the vicissitudes of a school of thought that started as a dissenting current opposing the Classical view that economic fluctuations should be considered the result of 'accidents' that only temporarily interrupt the rule of equilibrium. It was the apparent regularity of the occurrence of such accidents that gave way to the interpretation that fluctuations are the manifestation of some fundamental property of the economic system itself. At first this led to the development of a pure endogenous cycle theory but gradually the idea emerged that the observed patterns were brought about by a combination of factors wherein endogenous mechanisms as well as exogenous 'accidents' have a role to play. The insight that the internal mechanism tends to respond to external stimuli brought about the idea that the economy could be guided by autonomous impulses. In this case government could try to mitigate the effects of adverse shocks by stabilizing the movements of the economy.

In the heydays of Keynesianism it was thought that the business cycle could be kept under control. Monetary and fiscal authorities could stabilize it by administering a precisely pointed burst of positive and negative demand impulses. Their actions should be based on an econometric model that adequately described the functioning of the cyclical mechanism. In practice it appeared that large scale econometric models only had a limited capability to generate cyclical patterns. In order to mimic actual cyclical patterns the models had to be 'fuelled' by a constant stream of exogenous impulses. The effect was that interest gradually shifted from the endogenous propagation mechanism to the exogenous impulse mechanism. Even more so because the real economy proved to be sensitive of supply side impulses (such as the oil-shocks of the nineteen seventies) that had been neglected before.

It is significant that the external impulses, Mill's 'accidents', not only had a comeback as explanatory factors. In the course of time their importance increased relative to that of the endogenous factors to the degree that the former came to dominate the latter. This is the case with RBC-theory where random fluctuations in the rate of technological progress completely determine where the economy is going. Equilibrium is immediately re-established after every disturbance. Observed fluctuations are nothing but a continuously moving equilibrium and nothing can or should be done about it. Accordingly business cycle theory seemed to have gone full circle: The invisible hand seemed to have returned with a vengeance.

The reality of prolonged periods of high unemployment, however, could not be captured in terms of what Tobin called the 'elegant fantasies' of the 'Robinson Crusoe macroeconomics' of RBC-theory (Tobin, 1996). Neither could the recessions of the early 1980s, the early 1990 and the recession after 2001 be squared with the idea that that it is only random supply shocks that govern economic life. The pendulum swung back in the direction where the endogenous forces of adjustment and the consequent windows of opportunity for economic policy take centre stage again.

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