

BACK TO C19th BUSINESS AS USUAL: A SURPRISE?

Introduction.

I am sick of listening to confused economists' ad-hoc explanations of the current crisis. They have built their reputations by employing timeless equilibrium models of the economy, which assume, rather than proving, 'efficient' markets. Such parables have clearly been important to spreading the 'church' of the free-market, but why should we take any notice of such economists when they off-script try to enter the dynamic world as we really live it? We need a deeper non-equilibrium analyse which recognises that although the market may be 'efficient' it will periodically *defeat itself*. This is precisely what Marx set out to explain in *Capital*; how the exciting dynamic market system had inherent underlying tendencies, including centrally a tendency to crisis.

Marx criticised economists in his time for being obsessed with surface appearances, modelling the economy purely in physical, or as economists call them today 'real', terms. To break beneath the surface, *following* Smith and Ricardo, Marx worked in labour-time terms. It is his theory of the determination of the value of commodities by labour-time that leads Marx to predict recurrent crisis, moments of self-defeat, will inevitably occur in capitalism through a tendency for the profit rate to fall in labour-time terms as the economy grows. Kliman (2007) points out how many 'Marxist' economists have forgot this through retrospectively and inappropriately applying a mainstream equilibrium/simultaneous approach to Marx.

As this is a tendency Marx is not saying the profit rate will 'observably' smoothly decline in every boom, there are counter-tendencies, and we must remember Marx is talking in labour-time terms not nominal or 'real' money terms. Marx (1981) explains how in the C19th at the end of booms surplus capital pushes up speculation in fictitious capital (shares, futures etc). By surplus capital Marx means capital/profit

that firms do not want to productively invest due to deteriorating profitability in labour-time terms. This deterioration can be hidden on the surface by inflation of commodities' prices relative to their falling labour-time values and by the inflation of the 'value' of fictitious capital surplus capital produces. The underlying profitability problem in the 'real' economy thus simply manifests on the surface by investment in fictitious capital appearing to offer a higher return than productive investment. The fictitious capital bubble must inevitably burst and crisis result, appearing to be purely a financial crisis.

Grossmann (1929), written in 1928, repeats this argument to confidently predict a coming huge financial crisis and depression in the US. The fact that for the first time in my lifetime the UK has 'unexpectedly', and not by planned government action to combat inflation, fallen into recession/crisis proves to me just how significantly the UK has moved in a free-market direction back to its C19th roots. All that free-market economics did have an effect, but not one that free-market economists can hope to understand.

The Ideas.

The big idea is Marx's theory of the determination of commodities' values by labour-time. In the Preface of Volume Two of *Capital* (Marx, 1978) Engels explains how Marx thought Adam Smith had already discovered that the basis to profit was a surplus-value extracted from living labour in production. Ricardo builds on Smith but stumbles on how capitalists with different compositions of constant capital (non-living labour inputs) to variable capital (input of living labour) could realise the same rate of profit if surplus-value extracted from living labour is the sole source of profit. Engels states, Marx (1978) page 101,

‘This contradiction to the law of value was already known to Ricardo, but neither he nor his followers were able to resolve it. ... Marx had already resolved this contradiction ... the solution is to be included in Volume 3. Some months will pass until its publication.’

Nine years later in 1894 Volume Three of *Capital* arrived (Marx, 1981). Note Engels prepared Marx (1978) and (1981) for publication after Marx's death in 1883. Marx finally solves the problem he had alluded to in Marx (1976) page 421 in Chapter 9 of Marx (1981), entitled ‘Formation of a General Rate of Profit (Average Rate of Profit), and Transformation of Commodity Values into Prices of Production’. Commodities appropriated values (the values they exchange at) will systematically deviate from their produced values, tendentially equalising profitability across all competitive sectors of the economy without violating the concept that living labour is the sole source of new value and surplus-value. After demonstrating how his theory of value is an advance on Ricardo's Marx (1981) Part Three immediately moves on to explain how the profit rate will tend to fall in boom; capitalism will inevitably periodically defeat itself. This tendency results from the way capitalists compete with each other and applies to the profit rate in value terms not use-value terms. Dealing with the second issue first, Marx (1976) page 137 followed by Marx (1981) page 318 and 347,

‘variations in productivity have no impact whatever on the labour itself represented in value. As productivity is an attribute of labour in its concrete useful form, it naturally ceases to have any bearing on that labour as soon as we abstract from its concrete useful form. The same labour, therefore, performed for the same length of time, always yields the same amount of value, independently of any variations in productivity. But it provides different quantities of use-values during equal periods of time; more, if productivity rises; fewer, if it falls.’

‘There corresponds to this growing volume of constant capital – although this expresses only at a certain remove the growth in the actual mass of use-values which the constant capital consists of in material terms – a continual cheapening of the product.’

‘The profit rate does not fall because labour becomes less productive but rather because it becomes more productive’.

In Parts Two and Three of Marx (1981), for that matter in general, Marx holds the value of money constant at £1 = 1 hour of labour-time, ensuring that value in monetary expression or labour-time is quantitatively identical. Marx considers the possibility of a variable value of money in Marx (1981) pages 236 to 238,

‘if, other things being equal ... there is a change in the value of the money commodity. (This is so even with a purely nominal change in value, the rise and fall of tokens of value, as long as other factors remain the same.) Let the total capital be £100 and the profit £20, so that the rate of profit is 20 per cent. If the price of gold is now halved or doubled, in the first case the same capital that was previously worth £100 is now worth £200, and the profit has a value of £40 instead of £20 (i.e. it is expressed in this new amount of money). In the second case, the capital falls to a value of £50, and the profit is now expressed in a product valued at £10. In both cases, however, $200:40 = 50:10 = 100:20 = 20$ per cent. There would be no real change in the capital value in any case such as this, but simply a change in the monetary expression of the same value and surplus-value ... If it is only the money value that rises or falls (as a result of a change in the value of money), the monetary expression of the surplus-value rises or falls in the same proportion. The profit rate then remains unchanged.’

Don’t be fooled by purely nominal monetary expressions of value, adjust for the ‘value’ of money. But Marx does not want us to be fooled by use-value, so he does not mean economists’ conventional definition of ‘real’ terms; the value of money should not be understood as how many use-values a unit of money can buy. For Marx the value of money is how much labour-time a unit of money expresses. Marx explains how he thinks capitalists tend to compete in Marx (1976) Part Four and Marx (1981) Part Three. He stresses the central role of technological change in competition. The most advanced producers in each sector are most advanced precisely because they operate with the latest technology. Competition ensures capitals tend to get bigger and apply relatively more constant capital than living labour, Marx (1981) pages 325 to 326,

‘The course of the development of capitalist production and accumulation requires increasingly large-scale labour processes and hence increasingly large dimensions and increasingly large advances of capital for each individual establishment. The growing concentration of capitals (accompanied at the same time, though in lesser degree, by a growing number of capitalists) is therefore both one of its material conditions and one of the results that it itself produces. Hand in hand with this, in a relationship of reciprocity, goes progressive expropriation of the more or less immediate producers. In this way a situation comes about in which the individual capitalist have command of increasingly large armies of workers (no matter how much the variable capital may fall in relation to the constant capital),

so that the mass of surplus-value and hence profit which they appropriate grows, along with and despite the fall in the rate of profit. The reasons that concentrate massive armies of workers under the command of individual capitalists are precisely the same reasons as also swell the amount of fixed capital employed, as well as the raw and ancillary materials, in a growing proportion as compared with the mass of living labour applied.’

For the economy as a whole in boom constant capital input grows faster than living labour input. Productivity improvement will cheapen commodities so, assuming wages are fixed in use-value terms at a given material standard of living necessary to reproduce the worker, cheapen the worker. We have the production of relative surplus-value.¹ For each unit of living labour the variable capital component falls as surplus-value rises. If exploitation rose sufficiently quickly growth of surplus-value may even exceed the growth of constant capital, increasing the rate of profit (surplus-value divided by the total capital advanced in constant and variable capital). However, no matter how long it might be, the working day is finite. The ultimate limit of the growth of surplus-value, assuming workers only live on air, is the growth of living-labour input, which tends to grow slower than constant capital. So the rate of profit has a tendency to fall in times of accumulation/boom despite the counter-tendency of increased exploitation. Technological change leads to declining profitability sowing the seeds for eventual crisis; this appears contradictory, Marx (1981) pages 373-74,

‘No capitalist voluntarily applies a new method of production, no matter how much more productive it may be or how much it might raise the rate of surplus-value, if it reduces the rate of profit. But every new method of production of this kind makes commodities cheaper. At first, therefore, he can sell them above their price of production, perhaps above their value. He pockets the difference between their costs of production and the market price of the other commodities, which are produced at higher production costs. This is possible because the average socially necessary labour-time required to produce these latter commodities is greater than the labour-time required with the new method of production. His production procedure is ahead of the social average. But competition makes the new procedure universal and subjects it to the general law. A fall in the profit rate then ensues – firstly perhaps in this sphere of production, and subsequently equalised with the others – a fall that is completely independent of the capitalists’ will.’

In crisis the conditions necessary for restoration of higher profitability are enforced. Constant capital falls in price (suffers physical and moral depreciation), workers adjust their ‘expectations’ of how they must work and what constitutes a normal standard of living. Reforms are searched for in every conceivable area to restart the motor. Marx (1981) pages 358 to 359, note by producers Marx means immediate producers, the workers,

‘The *true barrier* to capitalist production is *capital itself*. It is that capital and its self-valorization appear as the starting and finishing point, as the motive and purpose of production; production is production only for *capital*, and not the reverse, i.e. the means of production are not simply means for a steadily expanding pattern of life for the *society* of the producers. The barriers within which the maintenance and valorization of the capital-value has necessarily to move – and this in turn depends on the dispossession and impoverishment of the great mass of the producers – therefore come constantly into contradiction with the methods of production that capital must apply to its purpose and which set its course towards an unlimited expansion of production, to production as an end in itself, to an unrestricted development of the social productive powers of labour. The means – the unrestricted development of the forces of social production – comes into persistent conflict with the restricted end, the valorization of the existing capital.’

Progress/technological change comes at a cost because of the fundamentally contradictory nature of the capitalist system. The valorisation process, value, drives the system, although use-value is necessary it is a side effect of capitalism’s historically specific and inevitably unstable/self-defeating valorisation process. Vulgar economists may imagine that the economy has an ideal equilibrium and blame exogenous shocks through human imperfection for divergence from this equilibrium, but Marx explains how at its heart the economic cycle is endogenous to the capitalist system (the outcome of the ‘efficient’ market).² If we accept Marx’s conclusion it must fundamentally change the way we view capitalism. As such Marx’s economics posed a political challenge to all who wished to present capitalism as a stable or at least manageable system. For this reason throughout the C20th many socialists and moderate ‘Marxists’ have tried to discredit Marx’s central conclusions. Kliman (2007) provides an extensive account of how Marx’s value theory was dismissed as being internally inconsistent throughout the C20th (including notably by Bortkiewicz, then Sweezy, Samuelson and Roemer).

In 1906-7 Bortkiewicz (1952 and 1982) set the battleground, the transformation ‘problem’, and devised the method of attack, applying a simultaneous and dualistic approach to Marx’s value theory. A dualistic approach to price and value imagines that produced value in labour-time is one world and appropriated value in money is another, they are two separate systems to somehow balance in equilibrium (Bortkiewicz’s equilibrium was a state of identically repeating simple reproduction). To preserve equilibrium/balance in the future a simultaneous approach imagines that the unit value of inputs must be re-valued to the unit value of outputs. The transformation problem becomes a ‘problem’. In Marx (1981) three aggregate

equalities hold through the transformation: total profit equals total surplus-value, total wages equals the value of variable capital and the total price of capital equals the total value of capital. Taking a simultaneous and dualistic approach ensures we can only preserve one of the three aggregate equalities, its up to us which we choose to preserve (Desai, 1979).³ ‘Marx’s’ value theory does not add up, it is internally inconsistent., please dismiss it or rather, if you are a ‘Marxist’ economist, correct it and re-examine its conclusions. Employing a simultaneous approach Okishio (1961) asserted the theorem that viable technological change (cost reducing at current prices) can never cause the ‘uniform’ profit rate to fall, in direct opposition to Marx’s prediction of a tendency for the rate of profit to fall in boom. Such is Marx conventionally understood by academics of the left (for example, Brenner, 1998). Steadman (1977) explained how employing the conventional simultaneous and dualistic ‘Marxist’ method makes value in terms of labour-time redundant/pointless because it is perfectly proxied by physical/use-value/conventional ‘real’ terms. ‘Marxist’ economics turns out to be no advance on neo-Ricardian or Sraffian economics.

But as Kliman (2007) explains all this depends on attributing to Marx a method that fails to deliver his own conclusions, while hermeneutically it makes logical sense to see if there is an possible interpretation of Marx’s method that actually does produce his central results. Only if no such interpretation exists can we say that Marx is internally inconsistent on his own terms. Since the 1980’s the Temporal Single System Interpretation (TSSI) of Marx (see Freeman and Carchedi, 1996) has set out to prove that Marx actually employed a sequential and non-dualistic approach. Following this approach Marx’s value theory is, and always has been, internally consistent, all of Marx’s central results hold. The transformation problem is no longer a problem, all three aggregate equalities generally hold (Kliman and McGlone, 1988). The Okishio theorem is overturned, the profit rate in value terms tends to fall in boom for precisely the reasons Marx suggested (as our model below shows).⁴

A sequential approach recognises that capital is advanced with its components having given unit values upon that advancement, production now occurs with the newly produced commodities having a potentially different unit value. The profit rate depends on the surplus-value extracted in production related to the value of the

advanced capital when it was actually advanced, and not on the value of the advanced capital if it were magically simultaneously made at the end of the period it acted as an input for! The TSSI of Marx thus abstractly imagines a sequence of periods with circulation following production at the end of each period.

A non-dualistic approach to price and value rejects the dualistic notion that produced values are purely a matter of labour-time and appropriated values are purely a matter of price in money. Both produced values and appropriated values can be expressed in labour-time or money through appropriately accounting for the value of money. Abstractly at the end of production each period we have a total produced value of capital with price formation determining the distribution of this total value between capitalists (to tendentially equalise profit across sectors). The value of money at the end of production each period is simply the total produced value of capital in term of labour-time divided by the total appropriated value of this capital in monetary expression. The inverse of the value of money is termed by the TSSI of Marx the monetary expression of labour-time (MELT), the number of nominal units of money that express one hour of labour-time. MELT is likely to change at the end of production each period, unless, like Marx normally does, we abstractly hold MELT constant. To uncover value in labour-time terms we must simply account for inflation, but not inflation in 'real' use-value terms but in terms of the monetary expression of labour-time.⁵

In summary the TSSI of Marx allows us to consider a consistent Marx who centrally predicts a tendency for the profit rate to fall in boom. Let us now turn our attention to the financial system. Lapavistas and Itoh (1999) record how Marx (1978) explains how the financial system/credit system organically grows to support the circuit of capital. Commercial credit, banks, stock markets etc, the financial system in general minimises the need to hold idle capital in money form, and through the creation of credit can flexibly support the expansion of the productive economy. The financial system is a powerful weapon for capitalism, but all capitalist swords are double-edged. As the financial system supports accumulation the contradictions accumulation produces heighten, to be snapped back in crisis, Marx (1981) pages 349-350, then page 359 and page 572,

‘the rate of profit, is the spur to capitalist production (in the same way as the valorization of capital is its sole purpose), a fall in this rate slows down the formation of new, independent capitals and thus appears as a threat to the development of the capitalist production process; it promotes overproduction, speculation and crises, and leads to the existence of excess capital alongside a surplus population.’

‘As the profit rate falls, so there is a growth in the minimum capital the individual capitalist needs ... This growing concentration leads in turn, at a certain level, to a new fall in the rate of profit. The mass of small fragmented capitals are thereby forced onto adventurous paths: speculation, credit swindles, share swindles, crises. The so-called plethora of capital is always basically reducible to a plethora of that capital for which the fall in the profit rate is not outweighed by its mass – and this is always the case with fresh offshoots of capital that are newly formed – or to the plethora in which these capitals, which are incapable of acting by themselves, are available to the leaders of great branches of business in the form of credit.’

‘If the credit system appears as the principal lever of overproduction and excessive speculation in commerce, this is simply because the reproduction process, which is elastic by nature, is now forced to its most extreme limit; and this is because a great part of the social capital is applied by those who are not its owners, and who therefore proceed quite unlike owners who, when they function themselves, anxiously weigh the limits of their private capital. This only goes to show how the valorization of capital founded on the antithetical character of capitalist production permits actual free development only up to a certain point, which is constantly broken through by the credit system. ... credit accelerates the violent outbreaks of this contradiction, crises.’

Can we simply inflate away the need for crisis to snap back the contradictions? Marx sees no *cure* in this approach, Marx (1981) page 621, then page 649,

‘In a system of production where the entire interconnection of the reproduction process rests on credit, a crisis must evidently break out if credit is suddenly withdrawn and only cash payment is accepted, in the form of a violent scramble for means of payment. At first glance, therefore, the entire crisis presents itself as simply a credit and monetary crisis. And in fact all it does involve is simply the convertibility of bills of exchange into money. The majority of these bills represent actual purchases and sales, the ultimate basis of the entire crisis being the expansion of these far beyond the social need. On top of this, however, a tremendous number of these bills represent purely fraudulent deals, which now come to light and explode; as well as unsuccessful speculations conducted with borrowed capital, and finally commodity capitals that are either devalued or unsaleable, or returns that are never going to come in. It is clear that this entire artificial system of forced expansion of the reproduction process cannot be cured by now allowing one bank, e.g. the Bank of England, to give all the swindlers the capital they lack in paper money and to buy all the depreciated commodities at their old nominal values.’

‘A devaluation of credit money (not to speak of a complete loss of its monetary character, which is in any case purely imaginary) would destroy all the existing relationships. The value of commodities is thus sacrificed in order to ensure the fantastic and autonomous existence of this value in money. In any event, a money value is only guaranteed as long as money itself is guaranteed. This is why many millions’ worth of commodities have to be sacrificed for a few millions in money. This is unavoidable in capitalist production, and forms one of its particular charms. In former modes of production, this does not happen, because given the narrow basis on which these move, neither credit nor credit money is able to develop. As long as the *social* character of labour appears as the *monetary existence* of the commodity and hence as a *thing* outside actual production, monetary crises, independent of real crises or as an intensification of them, are unavoidable. It is evident on the other hand that, as long as a bank’s credit is not undermined, it can alleviate the panic in such cases by increasing its credit money, whereas it increases this panic by contracting credit.’⁶

The second quote both recognises the possibility of a bank, such as a Central Bank, being able to alleviate crisis by creating credit, and the necessity for such potential creation of credit to be held back to protect the value of money. Marx is suggested that inflationary expansion is indeed possible but it can not cure the problems/actually resolve the contradictions that boom has heightened, the need for crisis is at best postponed. So the financial system both supports the expansion of the productive economy and as that expansion develops supports growing speculation in fictitious capital (shares, futures, property prices, debts in general, that are all the capitalisation of expected future streams of income and not real capital). But at the heart of the system the valorisation process limits the sustainability of expansion, as expressed by the tendency for the profit rate to decline. Inflation may be a temporary option to force unsustainable expansion but protecting the value of money ensures booms must end in crisis in the end (see Kliman, 1999b).

Grossmann (1929) seeks to not only confirm Marx's prediction of a tendency for the rate of profit to fall as capital accumulates but to link it with Marx's (1976, page 929) prediction that capitalism will bring about its own negation to build a theory of the breakdown of capitalism. Grossmann is critiquing attempts by revisionist Marxists, such as Hilferding, Kautsky and Otto Bauer, to present a 'balanced' vision of the development of capitalism. Grossmann is not proposing that capitalism will automatically end through pure economic breakdown as his opponents immediately suggested, and continued to suggest, see for example Mandel in Marx (1981, pages 85 to 87). Rather, Grossmann stresses that the falling rate of profit will lead to recurrent and worsening crises, in which profitability is restored, including notably by the devaluation of capital, laying the basis for renewed accumulation and following crisis, and so on. The crises are potential revolutionary situations that could, only if the working class are sufficiently organised, lead to revolution and the end of capitalism.⁷ Leaving aside such fundamental questions Grossmann stresses how surplus capital will grow as accumulation develops and the profit rate falls. When discussing Marx (1981) Chapter 15 Section 3. 'Surplus Capital Alongside Surplus Population' Grossmann (1992, the English translation of Grossmann, 1929) page 79 notes,

⁷A classic illustration is the United States today (March 1928) where, together with a superfluity of capital, shortage of investment opportunities and massive speculation in real estate and shares, there is a surplus working population of 4 million unemployed workers.

This not because too much surplus value has been produced but because in relation to the accumulated mass of capital too little surplus value is available.'

Grossmann very clearly predicts an imminent crisis, potential breakdown, for the United States, Grossmann (1992) pages 191 to 193,

'superfluous capital looks for spheres of profitable investment. With no chance in production, capital is either exported or switched to speculation. ... Let us take the present economic situation of the USA as an example of these movements. Despite the optimism of many bourgeois writers who think that the Americas have succeeded in solving the problem of crises and creating economic stability, there are enough signs to suggest that America is fast approaching a state of overaccumulation. ... The basic characteristic of the economic year 1927 is that industry and commerce have watched their production fall, ... The depressed state of industry is reflected by an expansion of speculative loans and speculative driving up of share prices. According to estimates of the US department of commerce, in 1927 the USA invested \$1.648 billion of new capital abroad. While this was partly matched by a reverse flow of \$919m, the greater part of this money flowed straight into the New York stock exchange for speculation. Advances by New York banks by way of brokers' loans on the stock exchange totalled \$4.282 billion at the start of May ... Today America is doing its best to avert the coming crash – already foreshadowed in the panic selling on the stock exchange of December 1928 – by forcing up exports. ... When these efforts are matched by a similar drive by the Germans and the British, the crisis will only be intensified.'

Grossmann also interestingly identifies Hilferding's (1981) concept of finance capital, the predominant role of banks in lending to and co-ordinating industry, as a temporary phase in capitalism that occurs only when capital is relatively short in supply. When capitalism is further developed capital is abundant, indeed tends to become surplus, Grossmann (1992) pages 199 to 200,

'Hilferding's exposition contradicts the actual tendencies of development of capitalism. It is also incompatible with the fundamental ideas of Marx's theory. For if Hilferding were right in arguing that the banks dominate industry, this would only shatter Marx's theory of the crucial importance of production itself to the structure of capitalism. The crucial role would then be played not by the production process but by finance capital, or structures in the sphere of circulation. ... At more advanced stages of accumulation industry becomes increasingly more independent of credit flow because it shifts to self-financing through depreciation and reserves. ... In countries like Britain, France and especially the USA, it is simply not possible to speak of industry being dependent on the banks. ... According to Vogelstein, this is one of the reasons why banks have been turning to the stock exchange by way of investments.'

In conclusion we suggest Marx's analysis of the process of capitalist accumulation provides a clear basis for understanding both the inevitability of crisis and capitalism's need for crisis to periodically restore the profit rate by destroying capital, precisely so that capital can be accumulated again. This apparently contradictory result simply follows from the contradictory nature of the capitalist system itself.

A Model.

It is the concepts in the preceding section, which really count. We do not claim these concepts to be absolute truths, but we do claim that they are internally consistent and represent an important alternative explanation of events, which should be much more widely known and researched in far greater depth. Our model cannot hope to prove these concepts, but neither can its imperfections be used to criticise these concepts in general. Our model simply attempts to illustrate these concepts in action; it is a first step that hopefully others will be encouraged to develop. In modelling we are inevitably immediately hit by the complexity of the system we wish to model. To avoid a paper of unacceptable length and complexity we must dramatically simplify while still hopefully capturing the essence of the concepts we wish to model. Consequently our model may appear unrealistic; such is economics.

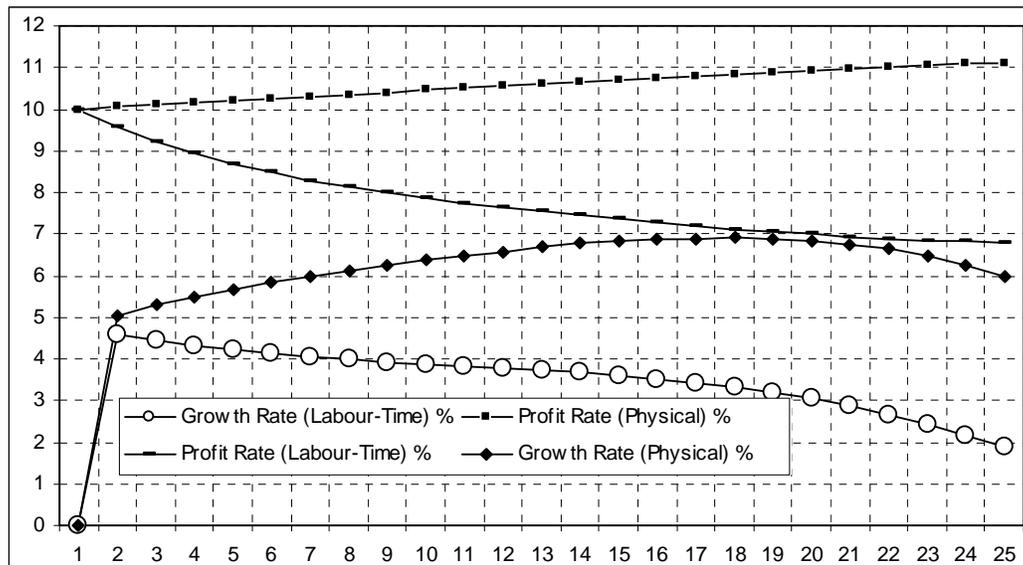
Our first simplification is to model at a very abstract level. We wish to reveal how underlying labour-time magnitudes behave during a boom. Rather than creating the surface behaviour in ‘real’/physical terms we would uncontroversially expect in a boom through modelling agents’ optimal decision making processes we shall abstract from such procedures by simply exogenously setting the surface appearance we would expect in boom.⁸

We shall simplify by modelling the productive economy at the aggregate level. We abstract from differences between productive capitalists and assume that only a single commodity is produced. As only one type of commodity is produced we have no transformation ‘problem’, there is no other type of commodity to match, thus allow, our single commodity’s appropriated value to deviate from its produced value.⁹ We abstract from any fixed capital or stocks i.e. we assume all productive capital circulates each period and is sold at the end of each period.¹⁰ We assume the market clears at the end of each period as we do not seek to model crisis, just the boom that we argue makes crisis inevitable. Because our sequential approach implies, by its very nature, that the current period always depends on the previous period we must think carefully about our ‘first’ period. We set our first period to be a period of simple reproduction (zero growth and technological change) that abstractly could have infinitely repeated itself in the past. We thus start from a well-behaved

stationary, but abstract, initial period/conditions. We enter boom in period 2 by assuming that at the end of period 1, and henceforth at the end of each period, productive capitalists choose to productively invest a proportion of their profits.

At our abstract level of analysis we can not model the process of competition between capitalists that Marx believes, at the same time, leads to the production of relative surplus value and the tendency for the profit rate in labour-time terms to fall. We shall limit the growth of living labour input to 0.5% a period, while assuming overall productive investment grows faster, to ensure input of constant capital grows faster than input of living labour. We hold the 'real' wage rate in terms of physical units of our commodity constant, so as our commodity cheapens in labour-time terms in boom the rate of exploitation rises; the worker is cheapened. Graph 1 shows how the profit rate in labour-time terms smoothly declines, despite the counter-tendency of increased exploitation a fixed 'real' wage produces.

Graph 1 – The Productive Economy.



To illustrate how this tendency does not rely on a falling physical/'real' profit rate let us assume the physical profit rate rises 0.05% a period. Abstracting from any production function we work back from the physical profit rate (recognising sequentially that inputs in physical terms are already established at the start of the period) to calculate output in physical terms. Our choose of physical profit rate

produces a healthy physical growth rate of ‘real’ GDP of between 5% and 7% a period, as shown in Graph 1. Such physical growth/technological progress ensures the unit labour-time value of our commodity falls each period. We have the uncontroversial features of a boom in surface ‘real’ terms accompanied by an underlying declining rate of profit in labour-time terms.

Let us turn to our abstract financial system. If we assumed productive capitalists entirely owned their inputs i.e. are in debt to nobody at the start of the period, they will own their entire output with no external claim on it at the end of the period (we assume no government, so no government claim through tax). We could assume banks exist and have lent to productive capitalists, but modelling the mediation of banks would be complex, while our focus is on the behaviour of fictitious capital. Let us simply assume that prior to our initial period productive capitalists had issued shares, which are held by financial capitalists/investors. We assume productive capitalists pay a proportion of their profits to investors in dividends on their shares each period (in the repeating period of simple reproduction before our first period and henceforth throughout our scenario). We abstractly imagine a rate of interest without modelling a Central Bank (any banks), with the ‘value’ of fictitious capital equalling the dividend paid divided by our exogenously set interest rate.

To ensure the market clears investors must entirely use their dividends for consumption. Clearly with a less abstract financial system any worries of insufficient demand to support a boom would be removed by that financial system’s flexible ability to create credit (and the public and the government’s willingness to accept debt).¹¹ In our abstract system the number of shares will stay constant as productive capitalists can fund their own productive investment from their own profits, so have no reason to issue new shares.

From the end of period 1 profit is entirely used up on dividends and productive investment; we have no room for surplus capital, the investment of any profit on fictitious capital. Before we consider why (when and how) productive capitalists turn to investment in fictitious capital let us more formally lay out our model so far. Let –

C constant capital input at the start of the production period.

V	variable capital input at the start of the production period.
L	labour-power applied in the production period
S	surplus-value produced by the end of the production period.
v	the unit value of our single commodity at the end of the production period.
Y	total productive capital at the end of the production period.
ρ	the profit rate at the end of the production period.
r	the rate of exploitation of labour in the production period.
p	the price of our single commodity at the end of the production period.
Φ	the monetary expression of labour-time (MELT) at the end of the production period.
α	the proportion of profit paid as dividends at the end of the period.
β	the proportion of profit that is productively invested next period.
δ	the proportion of profit that is speculatively invested at the end of the period.
K	fictitious capital at the end of the period.
TRK	the total return on holding fictitious capital at the end of the period.
i	the rate of interest at the end of the period.
π	inflation in 'real' terms for that period.
£	superscript indicates a variables value in nominal units of money.
o	superscript indicates a variable is expressed in physical units of our single commodity.
h	superscript indicates a variables produced value in terms of labour-time.
h*	superscript indicates a variables appropriated value in terms of labour-time.
t	subscript marks which period the variable applies to.

For example, Y_t^\pounds represents the monetary expression of total capital at the end of production at t (conventionally M'_t). Y_t^o represents the number of physical units of our commodity that make up total capital at the end of production at t. Y_t^h represents the total produced value of capital, measured in terms of labour-time, at the end of production at t (conventionally C'_t). Y_t^{h*} represents the total appropriated value of capital in terms of labour-time at the end of production at t. We apply no superscript to Φ_t the monetary expression of labour time (MELT), the number of nominal units of money, which represent one hour of labour-time at the end of production:

- (1) $C_t^{h*} = C_t^{\text{f}} / \Phi_{t-1}$
- (2) $V_t^{h*} = V_t^{\text{f}} / \Phi_{t-1}$

At the start of each period productive capitalists apply constant and variable capital. Following the TSSI of Marx the value in terms of labour-time of constant and variable capital is determined by the money advanced/paid for those inputs divided by the MELT holding at the time of their purchase in circulation at the end of the previous period. Φ_{t-1} equals the monetary expression of total capital at the end of period t-1 divided by the total produced value of this capital at the end of period t-1:

$$(3) \quad \Phi_{t-1} = Y_{t-1}^{\text{f}} / Y_{t-1}^{\text{h}} = p_{t-1}^{\text{f}} Y_{t-1}^{\text{o}} / v_{t-1}^{\text{h}} Y_{t-1}^{\text{o}} = p_{t-1}^{\text{f}} / v_{t-1}^{\text{h}}$$

With only a single commodity we have no transformation ‘problem’, appropriated value can not deviate from produced value $v_{t-1}^{h*} = v_{t-1}^{\text{h}}$, so the labour-time value of inputs equals their produced unit value last period times their physical quantity:

- (1) $C_t^{h*} = C_t^{\text{f}} / \Phi_{t-1} = v_{t-1}^{\text{h}} C_t^{\text{o}}$
- (2) $V_t^{h*} = V_t^{\text{f}} / \Phi_{t-1} = v_{t-1}^{\text{h}} V_t^{\text{o}}$

Production now occurs, workers work L_t^{h} hours (as agreed when wages were paid in advance at the end of the previous period), with V_t^{h*} and C_t^{h*} already determined we can now calculate end-period produced values in terms of labour-time:

- (4) $S_t^{\text{h}} = L_t^{\text{h}} - V_t^{h*}$
- (5) $r_t^{\text{h}} = S_t^{\text{h}} / V_t^{h*}$
- (6) $Y_t^{\text{h}} = C_t^{h*} + V_t^{h*} + S_t^{\text{h}}$
- (7) $\rho_t^{\text{h}} = S_t^{\text{h}} / (C_t^{h*} + V_t^{h*})$
- (8) $v_t^{\text{h}} = Y_t^{\text{h}} / Y_t^{\text{o}}$

To calculate the produced unit value of our commodity in terms of labour-time we must also know the total physical output of our single commodity. As explained we calculate Y_t^{o} back from our exogenous setting of the physical profit rate:

$$(9) \quad \rho_t^{\text{o}} = S_t^{\text{o}} / (C_t^{\text{o}} + V_t^{\text{o}})$$

$$(10) \quad \rho^f_t = [p^f_t Y^o_t - p^f_{t-1}(C^o_t + V^o_t)] / p^f_{t-1}(C^o_t + V^o_t)$$

Setting price exogenously at the end of the production period reveals the nominal profit rate (the ‘real’ profit rate simply equals the physical rate of profit). We can now also calculate the MELT established at the end of the production period. With only a single commodity appropriated values must equal produced values:

$$(11) \quad \Phi_t = Y^f_t / Y^h_t = p^f_t Y^o_t / v^h_t Y^o_t = p^f_t / v^h_t$$

$$(12) \quad v^{h*}_t = p^f_t / \Phi_t = p^f_t / p^f_t / v^h_t = v^h_t$$

$$(13) \quad Y^{h*}_t = Y^f_t / \Phi_t = p^f_t Y^o_t / p^f_t / v^h_t = v^h_t Y^o_t = Y^h_t$$

$$(14) \quad \rho^{h*}_t = [Y^f_t / \Phi_t - (C^f_t + V^f_t) / \Phi_{t-1}] / [(C^f_t + V^f_t) / \Phi_{t-1}]$$

$$\rho^{h*}_t = [p^f_t Y^o_t / p^f_t / v^h_t - p^f_{t-1}(C^o_t + V^o_t) / p^f_{t-1} / v^h_{t-1}] / [p^f_{t-1}(C^o_t + V^o_t) / p^f_{t-1} / v^h_{t-1}]$$

$$\rho^{h*}_t = [v^h_t Y^o_t - v^h_{t-1}(C^o_t + V^o_t)] / v^h_{t-1}(C^o_t + V^o_t) = S^h_t / (C^{h*}_t + V^{h*}_t) = \rho^h_t$$

At the end of production total profit in terms of labour-time equals S^h_t , with monetary expression $\Phi_t S^h_t$. Following the TSSI of Marx, if $v^h_t \neq v^h_{t-1}$ the value of the physical surplus product in labour-time terms, $v^h_t S^o_t$, will not equal total surplus-value in labour-time terms, S^h_t . If we substitute equations (1) and (2) into equation (8):

$$(8) \quad v^h_t = Y^h_t / Y^o_t = (S^h_t + v^h_{t-1} C^o_t + v^h_{t-1} V^o_t) / (C^o_t + V^o_t + S^o_t)$$

$$v^h_t C^o_t + v^h_t V^o_t + v^h_t S^o_t = S^h_t + v^h_{t-1} C^o_t + v^h_{t-1} V^o_t$$

$$(15) \quad S^h_t = (v^h_t - v^h_{t-1})(C^o_t + V^o_t) + v^h_t S^o_t$$

$$(16) \quad p^f_t S^o_t = v^h_t \Phi_t S^o_t \neq \Phi_t S^h_t \text{ unless } v^h_t = v^h_{t-1}, \text{ as } v^h_t S^o_t \neq S^h_t \text{ unless } v^h_t = v^h_{t-1}$$

The monetary expression of surplus value does not equal the monetary expression of the surplus product in physical terms. Substituting (15), (1) and (2) into (7):

$$(17) \quad \rho^h_t = [(v^h_t - v^h_{t-1})(C^o_t + V^o_t) + v^h_t S^o_t] / (v^h_{t-1} C^o_t + v^h_{t-1} V^o_t)$$

The profit rate in labour-time terms does not equal the profit rate in physical terms unless technology is constant i.e. $v^h_t = v^h_{t-1}$. Such divergence rests on the TSSI of Marx’s recognition that sequentially last period’s values in labour-time terms effect

this period's values in labour-time terms. As $v_t^h < v_{t-1}^h$ throughout our boom profitability in labour-time terms will be below profitability in physical terms.

Let us turn to the split of profit between dividends and productive investment. Productive capitalists' actual profit in labour-time terms is S_t^h with monetary expression $\Phi_t S_t^h$, but in 'real' terms they may perceive it as $p_t^f S_t^o$. So on what basis do we proceed? We shall assume productive capitalists identify their profit as S_t^h , with monetary expression $\Phi_t S_t^h$. We will find for our model, as long as we assume no speculative investment by productive capitalists, that the growth of fictitious capital in nominal terms equals the growth rate of $\Phi_t S_t^h$. In our scenario $p_t^f S_t^o$ growth exceeds $\Phi_t S_t^h$ growth. If we were to adjust our scenario to reflect productive capitalists perceive their profit as $p_t^f S_t^o$ then, as $p_t^f S_t^o$ growth is higher, fictitious capital would grow faster. The total return on holding fictitious capital in nominal terms (dividend plus capital gain) would immediately exceed the nominal profit rate in period 2, our first boom period, and continue to exceed the nominal profit rate every period thereafter.¹²

We shall assume productive capitalists identify their profit as $\Phi_t S_t^h$ in monetary expression and at the end of each period (including our repeating period of simple reproduction before our first period) pay $\alpha_t = 0.5$ of $\Phi_t S_t^h$ as dividends, while, from the end of period 1 onwards, productively investing $\beta_t = 0.5$ of $\Phi_t S_t^h$. The 'value' of fictitious capital at the end of a period is given by the dividend paid divided by the rate of interest:

$$(18) \quad K_t^f = \alpha_t \Phi_t S_t^h / i_t^f$$

$$(19) \quad \text{TRK}_t^f = (\alpha_t \Phi_t S_t^h + \alpha_t \Phi_t S_t^h / i_t^f - \alpha_{t-1} \Phi_{t-1} S_{t-1}^h / i_{t-1}^f) / \alpha_{t-1} \Phi_{t-1} S_{t-1}^h / i_{t-1}^f$$

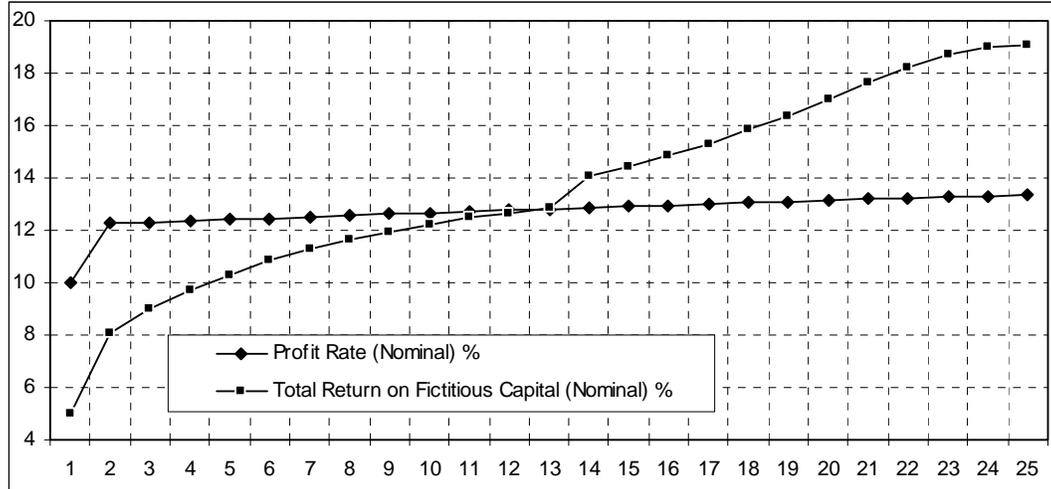
The total return on holding fictitious capital in nominal money terms, TRK_t^f , equals the dividend plus any capital gain, divided by the 'value' of fictitious capital at the end of the previous period. We assume $i_t^f = 5\%$ and $\alpha_t = 0.5$ throughout our scenario. With $i_t^f = i_{t-1}^f$ and $\alpha_t = \alpha_{t-1}$ the total return on fictitious capital equals the dividend divided by last periods 'value' of fictitious capital plus the growth rate of the dividend, which is equal to the growth rate of $\Phi_t S_t^h$. TRK_t^f will grow as price rises or, the unit labour-time value of our commodity falls or, surplus-value rises. The total

nominal return from investing productive capital is simply the nominal money profit rate, which can be expressed as equation (20) with π_t^f representing inflation in ‘real’ terms $(p_t^f - p_{t-1}^f) / p_{t-1}^f$:

$$(20) \quad \rho_t^f = \rho_t^o(1 + \pi_t^f) + \pi_t^f$$

We exogenously set $\rho_t^o = 10\%$ for period 1 and then as growth commences in period 2 increase ρ_t^o by 0.05% a period.¹³ From period 2, our first boom period, we assume π_t^f stays constant at 2% a period until the end of our scenario. ρ_t^f jumps to 12.25% at the end of period 2 and then gradually rises to 13.33% by period 25, see Graph 2. ρ_t^f is not boosted/effected by changes to S_t^h or v_t^h whereas $\Phi_t S_t^h$ crucially is. In boom v_t^h declines, helping to increase Φ_t , and S_t^h grows (as L_t^h and exploitation grows), so the return on holding fictitious capital rises. We can just see in Graph 2 how the nominal return on productive investment falls below the nominal return from holding fictitious capital in period 13 ($\rho_t^f = 12.81\%$, $TRK_t^f = 12.85\%$).

Graph 2 – Return on Productive Investment and on Speculative Investment.



If we were to hold MELT (Φ_t) constant at one throughout our boom the nominal money profit rate would equal the profit rate in labour-time terms. With, as we have assumed $\alpha_t = \alpha_{t-1}$, the return on holding fictitious capital becoming:

$$(21) \quad TRK_t^f = (S_t^h + S_t^h/i_t^f - S_{t-1}^h/i_{t-1}^f) / S_{t-1}^h/i_{t-1}^f$$

Assuming $i_t^f = i_{t-1}^f$, TRK_t^f would simply rise in boom as the mass of profit rises, while the rate of profit ($\rho_t^f = \rho_t^h$) falls through $C_t^h + V_t^h$ growth exceeding S_t^h growth. If the return on holding fictitious capital were initially below the profit rate we would thus expect it to eventually rise above the profit rate. If we keep $\Phi_t = 1$ in our boom scenario by setting $p_t^f = v_t^h$, TRK_t^f still rises above ρ_t^f in period 13.

If Φ_t rises, the value of money in labour-time terms falls ($1/\Phi_t$), ‘inflation’ thus distorts the surface appearance, but we contend does not prevent the underlying situation in labour-time terms from manifesting on the surface through $TRK_t^f > \rho_t^f$ eventually (in our scenario with 2% inflation in ‘real’ terms each period in period 13). Conventional inflation in ‘real’ terms is not driving this result as such inflation effects both TRK_t^f and ρ_t^f . In contrast inflation caused by p_t^f falling to fall with v_t^h , the component of inflation missed by ‘real’ terms, only effects TRK_t^f and not ρ_t^f (with S_t^h growth also only effecting TRK_t^f and not ρ_t^f).

In period 13 speculative investment appears to offer a better return than productive investment, so let us now theorise how productive capitalists’ speculative investment of surplus capital may effect fictitious capital. If we simply assumed productive capitalists speculatively invest surplus capital and conveniently investors wished to sell fictitious capital equal to that surplus capital (to support increased personal consumption), investment of surplus capital need not have any effect on the ‘value’ of fictitious capital. But this is not a speculative boom. On the other hand if no investors wished to sell, attempted speculative investment of surplus capital would simply bid up the price of fictitious capital upwards until someone did eventually want to sell. Generally at any time an increase in speculative investment may push the price of fictitious capital up, large capital gains are likely to further increase speculative investment, creating even larger capital gains, and so on. A speculative bubble may thus occur, no matter the situation in the productive economy or whether productive capitalists speculatively invest surplus capital or not. Bubbles are always possible. The bubble we are considering is thus a particular bubble, one that results from the tendential behaviour of the productive economy in boom.

Less abstractly productive capitalists’ surplus capital may be deposited in banks and form the basis of a multiple expansion of credit lent to speculators for speculation,

thus multiplying the impact of surplus capital on fictitious capital. Productive capitalists could (ask an investment bank to do it for them) leverage up their surplus capital by investing in derivatives. Clearly any credit expansion facilitated by surplus capital would be likely to increase demand for the output of productive economy if part of that credit was used to back increased personal consumption or even expand production! The flexible credit system may thus ensure that while some productive capitalists speculatively invest and deposit with banks surplus capital, other, potentially new, productive capitalists expand productive investment. Sufficient credit creation may thus *both* support continued fast growth for the productive economy and an unsustainable fictitious capital bubble caused by *some* productive capitalists' non-productive investment of surplus capital.

To simply model a leveraged effect of surplus capital on fictitious capital let us assume:

$$(22) \quad K_t^f = (\alpha_t + \delta_t)\Phi_t S_t^h / i_t^f$$

Where δ_t is the proportion of profit that is speculatively invested at the end of the period. The effect of surplus capital on the 'value' of fictitious capital is multiplied by $1/i_t^f$. We shall keep α_t constant at 0.5 throughout our scenario, and assume β_t falls as δ_t rises, slowing the pace of productive investment. To ensure the market clears we assume investors increase their personal consumption by the injection of surplus capital at the end of each period. We assume at the end of period 14, our first period of productive capitalist speculative investment of surplus capital, that β_t drops by 1% to 0.495 as δ_t rises from 0 to 0.005. From period 15 to period 25 we assume β_t declines by 1.3 times its percentage decline in the previous period i.e. at an escalating rate. By period 25 $\beta_t = 0.228$ and $\delta_t = 0.272$. To match falling productive investment we assume the growth of living labour input also declines by 1% in period 14 and then by the same 1.3 times its percentage decline in the previous period. Graph 1 shows how growth in labour-time terms, which is already gradually declining, declines further as surplus capital grows/productive investment falls, with physical growth also eventually turning down (would turn down faster if we did not continue to exogenously increase ρ_t^o by 0.05% a period).

By assuming a large multiplier effect of surplus capital on fictitious capital the small amount of speculative investment of surplus capital in period 14 has a big impact on TRK_t^f , as illustrated in Graph 2. From period 15 to period 24, as surplus capital grows, the return on fictitious capital is boosted further above the return from productively investing. The capital gains component of TRK_t^f grows in relative importance to the dividend:

$$(23) \quad TRK_t^f = \frac{[\alpha_t \Phi_t S_t^h + (\alpha_t + \delta_t) \Phi_t S_t^h / i_t^f - (\alpha_{t-1} + \delta_{t-1}) \Phi_{t-1} S_{t-1}^h / i_{t-1}^f]}{(\alpha_{t-1} + \delta_{t-1}) \Phi_{t-1} S_{t-1}^h / i_{t-1}^f}$$

As surplus capital boosts overall TRK_t^f the dividend divided by last period's total 'value' of fictitious capital falls; investors in booming fictitious capital markets become dividend 'blind'. In period 25 the gap between TRK_t^f and ρ_t^f slightly narrows. If we were to allow productive investment to decline further by moving into additional periods growth would continue to slow, with TRK_t^f dropping below ρ_t^f in period 30. It is time for the bubble to burst; the already slowing economy will be hit by crisis breaking out in the fictitious capital market.

Our scenario is complete. Our abstract model has illustrated a particular way surplus capital, made surplus by declining profitability in labour-time terms in the productive economy, can create an unsustainable boom of fictitious capital. We could model how fictitious capital bubbles may result from productive capitalists' investment of surplus capital, made surplus by declining profitability in labour-time terms, in many different ways. Our particular approach thus acts as an illustration of the process and not as a definitive account of how surplus capital must behave.

Conclusion.

If we simply focus on 'real' terms, like nearly every economist does, the profit rate is unlikely to decline in boom, so what does it matter that the 'unobservable', 'underlying', 'mystical' profit rate in labour-time terms falls? Nearly every economist would say thank you, but where is the manifestation? We have shown how inflation (meaning the decline in the labour-time value of money, $1/\Phi_t$) may distort surface appearances away from the situation in labour-time terms. But this does not stop the underlying situation in labour-time terms from manifesting on the surface through the return on holding fictitious capital rising in booms, potentially above the return from productive investment. This result essentially rests on the idea that the behaviour of fictitious capital depends on the mass of profit while the rate of profit depends on the mass of profit in relation to total capital advanced. Speculative investment of surplus capital is likely to become more attractive to productive capitalists the longer/more intense a boom lasts/becomes. Such investment is likely to make speculative investment in fictitious capital seem more attractive to all. We have a bubble, not an accidental random bubble, but one rooted in the tendential behaviour of the productive economy; we have our manifestation.

Of course a purely financial bubble, unrelated to falling profitability in labour-time terms may occur (notably in a simply reproducing or slowly growing economy); and the present financial crisis may be such a bubble. Alternatively, at least for a while, government control/influence over the financial system and productive economy may prevent bubbles and 'successfully' manage the cycle by deciding when to slow the economy/create crisis, thus preventing 'unexpected' crisis. But this is not the point. Marx shows us how if we allow the economy to just let rip, and use its amazing expansionary powers to their full extent, it's bound to end in crisis in the end, boom endogenously creates the conditions for crisis; capitalism inevitably periodically defeats itself. So crisis is unavoidable, whether it is government planned or, purely the product of financial system or, just 'arrives' 'unexpectedly' in the end.

Endnotes.

1. Surplus-value may also rise through lengthening the working day or dropping wages below workers' accustomed cost of reproduction. Such production of absolute surplus-value is however more likely to be enforced in crisis than boom. An individual capitalist may increase the surplus-value they extract from their own workers by making their workers work at above average intensity. But if all workers are made to work more intensely the effect is simply higher average intensity, more units of use-value per average hour of labour, an increase in the productivity of labour.

2. Crisis may occur for many other reasons, including war, disaster, workers' wage push or 'pure' financial crisis (as we shall shortly explore). But the point is that the tendency for the profit rate to fall will ensure crisis must inevitably result even if there is no war, disaster, workers' wage push or 'pure' financial crisis etc.

3. Some simultaneous and dualistic interpretations of the transformation problem, such as Loranger (2004), claim to satisfy all three equalities by introducing certain further 'reasonable' assumptions/restrictions. Kliman (2007) proves that Loranger's 'solution' only satisfies all three equalities if we 'reasonably' allow prices and money wages to be negative in certain scenarios!

4. The validity of the Okishio theorem is debated in Freeman (1999), Kliman (1999a), Freeman and Kliman (2000a and 2000b), Foley (1999 and 2000) and Laibman (1999a, 1999b, 2000a and 2000b). All contributors recognise possible exceptions to the Okishio theorem if a sequential approach is employed instead of a simultaneous approach and how the profit rate in value and physical/material terms may diverge. Given the Okishio theorem claims that the 'universal' profit rate can never fall for the reasons Marx suggested such exceptions clearly refute the theorem. However Foley questions the importance of focussing on the value profit rate over the material rate, while Laibman employs replacement cost valuation to, in a sequential setting, reproduce the simultaneous assumption that the value of inputs is determined by the value of outputs of the same period. Freeman and Kliman stress the importance of the profit rate in value terms, not use-value/material terms to Marx's work and that profit must be related to the value of capital when it is actually advanced at the start of production. Potts (2009a) illustrates how the Okishio theorem holds if we follow a simultaneous and dualistic (SAD) approach or the New Interpretation (NI), but fails if we follow the TSSI of Marx. Valuing inputs at the value of outputs by SAD or NI calculation ensures that in boom the total capital applied in value terms falls each period, thus boosting the profit rate in value terms to the material rate (this is clearly evident in Laibman, 2000b). We have no decline in the value profit rate because we never have a boom/accumulation in value terms in the first place! Meanwhile critics of the TSSI of Marx (notably Mohun, 2003, and Mohun and Veneziani, 2007) try to find increasingly obscure reasons to challenge the TSSI's internal consistency (as refuted by Kliman and Freeman 2006, and Freeman and Kliman, 2008). We should remember that the TSSI of Marx simply aims to bring a consistent Marx back to the debate by clearing him of false allegations of internal inconsistency; it neither claims that Marx was necessarily right about everything or that alternative concepts of value have nothing to offer.

5. If by employing a simultaneous and dualistic approach labour-time terms are perfectly proxied by physical terms, inflation can only be conceived of as being in conventional 'real' terms.
6. Marx (1981) page 649 continues '... The suspension of cash payments by the so-called national banks, which is resorted to as the sole expedient in all extreme cases, shows that even now no metal is needed at home.' (But is still needed for international settlement). Marx's understanding of the financial system is clearly taking his monetary theory far beyond any simple notion of a 'well-behaved' commodity money world.
7. Kuhn (2007) pages 134 to 137 explains how the final chapter of Grossmann (1929), which considers the link between breakdown and revolution, is missing from the English translation Grossmann (1992), but is available in English in Lapides (1994). We should also note how Kuhn refers to Grossmann as Grossman. Potts (2009b) explains how Grossmann's illustration of the falling rate of profit can easily be adjusted to disprove the Okishio theorem, which would not even be stated for another 30 years! Potts (2009b) concludes that Grossmann's sequential analysis at the aggregate level has far more in common with the TSSI of Marx than any other modern version of Marxist economics.
8. In general we are sceptical of attempts to model 'rational' behaviour. Usually agents are assumed to maximise in a 'rational' simultaneous system. Furthermore we suggest outside of constrained economic models 'real' terms represent a particular imperfect form of monetary valuation. As we have to adjust from nominal to 'real' by some method they should not be considered less abstract than labour-time terms, which also adjust from nominal to alternatively arrive at labour-time.
9. We must stress that this is not a requirement of the TSSI of Marx, as Veneziani (2004) suggests (refuted in Kliman, 2007), it is simply the consequence of aggregate single-commodity analysis. The non-dualistic nature of the TSSI of Marx would allow us to introduce different types of commodity far more easily than dualistic interpretations of Marx; the transformation 'problem' would still add up, whereas dualistic concepts of price and value become internally inconsistent.
10. At our high level of abstraction with just a single commodity productive capitalists could simply pay dividends, personally consume and apply constant and variable capital in kind. We thus abstractly assume that productive capitalists must sell their output to each other, advance wages in money and pay dividends in money. For a discussion of how following a TSSI of Marx to value commodities in the presence of stocks see Potts (2009c).
11. We are struck by how Circuitists worry over how demand may be insufficient to realise profit in their self contained circular periods; profit and interest are dependent on an expansion of debt/fictitious capital (for example see Parguez, 1996). Through neglecting production they fail to see how the extraction of surplus-value in production creates the basis for profit each period. Demand may not always match supply, as is manifest in crisis, but supply, the production of value and surplus-value, does create the possibility of the realisation of that value, demand.

12. Furthermore if we reduce the proportion of $p^f S_t^o$ used for productive investment and increase the proportion paid as dividends, physical growth drops. The growth in capital advanced in labour-time terms declines faster, potentially to (or even below) the growth rate of surplus value, causing profitability in labour-time terms to stop falling (even start to rise again). We are no longer in boom, we are experiencing stagnation in value terms, with the ‘value’ of fictitious capital soaring ahead of the value of productive capital. Could this scenario more accurately reflect events since the 1980’s? Clearly there is room for further research.

13. We assume for period 1, and for every identical simply reproducing repeating period before period 1, that, $C_t^f = C_t^h = 90$, $C_t^o = 18$, $L_t^h = 20$, $V_t^f = V_t^h = 10$, $V_t^o = 2$, $Y_t^f = Y_t^h = 110$, $Y_t^o = 22$, $v_t^h = 5$, $p_t^f = 5$, $\Phi_t = 1$, $\rho_t^f = \rho_t^h = \rho_t^o = 10\%$, $i_t^f = 5\%$, $\alpha_t = 0.5$ and $K_t^f = 100$. For every period before period 1 $\beta_t = 0$ as productive capitalists personally consume all profit not paid in dividends. At the end of period 1 β_t becomes 0.5, as productive capitalists’ personal consumption ceases, ensuring growth commences from period 2 onwards.

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