The Compatibility of Marxian and Keynesian Economics: A Critical Assessment of Two Interpretations of Marx

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This paper contrasts two converse interpretations of Marx which are assessed regarding their compatibility with Keynesian concepts of effective demand, independent investment and endogenous money. On the one hand, the orthodox interpretation abstracts from money and assumes the validity of Say's law. Effective demand does not play a role. It is drawn from Marx's treatment of the general law of capitalist accumulation and the law of the tendency for the rate of profit to fall. On the other hand, the monetary interpretation highly regards of demand, investment and money. Money is the trigger of a general glut as it allows for the separation of purchase and sale as a means of circulation. As a means of payment, money implies its endogenous creation through lending. It is laid out in Marx's treatment of the reproduction and circulation of the aggregate social capital, his analysis of money and credit and his rejection of Say's law.

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1. Introduction

Various methodological, epistemological and theoretical discrepancies among the variety of schools of thought offer pluralism, but impede the emergence of a common research program (cf. Harvey and Garnett 2008). Hence, there have been several endeavors aimed at integrating Marxian and Keynesian approaches by trying to find shared principles and overcome disparities.i

This paper seeks to contribute to this integration process of Marxian and Keynesian ideas. It focuses on selected core ideas in Karl Marx's economic work and tries to contrast those of his views that are hardly compatible with the Keynesian ideas with those which are more accessible to them. In particular, we want to present two different Marxian theories of accumulation each peaking in a different form of crisis and assess their compatibility with the post-Keynesian economic framework.

The first view on Marx which we want to address is the so called orthodox interpretation (Hein 2004, pp. 59-87). This view offers a theory of the business cycle based on the interdependence of real factors such as accumulation, distribution and employment (Marx 1867, pp. 612-621). For the long run, the orthodox interpretation of Marx identifies the dynamics of capitalist accumulation to be the very origin of its crisis. Abstracting from money, capital accumulation is associated with labor saving technological progress that may increase the profitability of a single capitalist, but eventually will erode the profit rate of the capitalist class. The law of the tendency of the rate of profit to fall (Marx 1894, chs. 13-15) ensures that the economy will end up in a crisis of over-accumulation (Marx 1894, pp. 247-266).

This view shall be contrasted with a monetary interpretation of Marx which highlights the importance of demand for the realization of production. This view focuses on Marx's (1885, chs. 20, 21) discussion of the circulation and (expanded) reproduction of capital, where he emphasizes the general insufficiency of aggregate demand to match aggregate supply in the capitalist mode of production which may result in a crisis of over-production. This interpretation highlights the importance of money for Marx (1867, pp. 103-145; 1894, ch. 2; 1861-63, ch. 17). According to this interpretation, it is through the existence of money that the logics of the capitalist mode of production manifest themselves in recurring periods of stagnation and crisis.

In order to operationalize the assessment of both interpretations from a post-Keynesian perspective, we shall limit our endeavor to the application of only three categories which are central in post-Keynesian theory: effective demand, independent investment and endogenous money.

To the reader, the attempt to integrate Marxian and Keynesian concepts may seem an impossible and inappropriate undertaking for the following reasons: First, Marxian and Keynesian economics originate in contexts that could not be more diverse. Fast accumulation and growth, high levels of employment and fierce competition in the 19th century are followed by slow economic dynamics, significant unemployment and increasing market concentration in the first half of the 20th century (Nell 1996, p. 53-56). Second, related to the first objection, the two approaches are concerned with different time horizons. Whereas Marx was interested in the long-run perspectives of the capitalist mode of production, Keynes was inspired by the Great Depression and tried to find answers to short-run challenges in economic policy.

These objections do not fully apply to our analysis, as we are not primarily interested in integrating Marx's and Keynes's initial work but integrating the two economic paradigms that are based on them. Both Marxian and Post-Keynesian economics claim to have explanations for today's reality and, although they rest upon different traditions, both of them bear - certainly arguable - implications for short- and long-run analysis as well as for different layers of abstraction. We want to assess in how far modern Marxian economics, objectified in selected interpretations of Marx, is consistent with the various implications of modern post-Keynesian economics.

The paper is organized as follows: Section 2 briefly discusses the categories by which the post-Keynesian content in the Marxian theories considered will be assessed. In section 3, a short outline of the Marxian theories of the business cycle and of the falling rate of profit linked to the concept of over-accumulation shall be presented. Major issues which arise from a post-Keynesian point of view shall be discussed. Section 4 presents the monetary interpretation of Marx based on his treatment of the expanded reproduction of capital and on his thoughts on money. Again, a critical assessment of this interpretation will be given. Section 5 concludes.

2. Keynesian concepts: effective demand, independent investment and endogenous money

Even though, the post-Keynesian current of economic thought is a collection of Keynesian, Kaleckian and Sraffian traditions, we want to identify basic post-Keynesian views on demand, investment and money for which there seems to be a consensus (cf. Eichner and Kregel 1975 and Shapiro 1977).

Effective demand after Keynes (1936, pp. 27-28) and Kalecki (1971, ch. 8) is believed to drive the economy since Say's law - the proposition that supply creates its own demand - is rejected by post-Keynesians. For them, the economy's supply constraints are, in general, not binding. Rather, the economy is effectively restricted by the scale of aggregate demand comprising consumption and investment demand. One reason for the importance of effective demand has been identified by Keynes (1936, p. 20) who argues that the existence of money allows for its use as an asset. Saving a part of the income, however, implies that demand is not appropriate to meet supply, if investment does not compensate for the loss in consumption. Since there is no mechanism which aligns investment to savings, the economy left alone will generally suffer under a demand gap. Since post-Keynesians are concerned with generalizing Keynes' short-run analysis to the long run (Robinson 1956, p. vi), for them, the principle of effective demand needs to hold for all time horizons. If we accept the view of Kalecki (1971, p. 165) that "the long-term trend is but a slowly changing component of a chain of short-period situations", there are essentially no mechanism driving the economy in the long run other than those operating in the short run.[ii]

Investment, in fact, is perceived as an independent variable that is not determined by the amount of available savings (Kalecki 1971, ch. 10; Keynes 1936, chs. 11-12). Rather, investment is the precondition for savings. In equilibrium, an increase in investment will raise the level of aggregate income (Kalecki 1971, ch. 8) or change the distribution of income (Nicholas Kaldor 1957) such that the new stream of income generates savings equal to the initial increase in investment. Thus, the identity between investment and savings holds ex post in post-Keynesian economics. The causation is reversed compared to (neo-)classical economics: Investment causes savings to adjust (Gordon 1995). Moreover, post-Keynesians reject the neo-Classical view that the interest rate would equilibrate investment and savings at full employment, as their view on money reveals.

Money is endogenous. It is "[introduced] into the economy through a process which remains largely beyond the control of the central bank" (Rochon 1999, p. 57). Money is, in fact, created by the economic process itself. It is demand determined, in particular by the demand for loans. "[A] flow of credit money has been created ex nihilo, at a simple stroke of the pen. This flow of money is endogenous; it is the result of the credit needs of firms, consequent to their production plans" (Lavoie 1992, p. 153). Via the economic circuit, these loans are channeled into deposits which implies that investment leads to corresponding savings and not the other way round. The interest rate which is the endogenous variable in the neo-Classical money market is strongly influenced, if not determined, by the monetary authority in post-Keynesian economics. The endogenous creation of money is the ultimate prerequisite for investment to be independent from available funds.

As we have now identified the most important principles that are generally shared by post-Keynesian, we now turn first to the orthodox and then to the alternative interpretation of Marx and to the respective footings in his work.

3. The orthodox view: accumulation and distribution in real analysis

This interpretation abstracts from money and tries to identify real long-run dynamics. It is rooted, in particular, in Marx's treatment of the relationship between accumulation and profitability (Marx 1867, pp. 612-621; 1894, chs. 13-15).

Accumulation and distribution at given technology: theory of the business cycle

In this analysis, Marx takes technology as given and assumes it not being advanced by accumulation. Under this condition, he argues,

> [...] the demand for labor and the subsistence-fund of the labourers clearly increase in the same proportion as the capital [...] increases. [...] [T]he demand for labourers may exceed the supply, and, therefore, wages my rise. (Marx 1867, p. 613)

As has been demonstrated by Goodwin (1967), these relationships can be formalized by

$$e = e(g), \quad \frac{\partial e(g)}{\partial g} > 0, \tag{1}$$

$$w = w(e), \quad \frac{\partial w(e)}{\partial e} > 0, \tag{2}$$

the rate of employment (e) being a positive function of the rate of accumulation (g) and the real wage rate (w) a positive function of employment (e).

Given the technology, however, increasing wages reduce the capitalists' profits accordingly, which, for Marx, turns out to be an inevitable systemic barrier of that wage expansion:

> [A] rise in the price of labour resulting from accumulation of capital implies the following alternative: Either the price of labour keeps on rising, because its rise does not interfere with the progress of accumulation. [...] Or, on the other hand, accumulation slackens in consequence of the rise in the price of labour, because the stimulus of gain is blunted. The rate of accumulation lessens; but with its lessening, the primary cause of that lessening vanishes, i.e., the disproportion between capital and exploitable labor-power. (Marx 1867, p. 619)

In order to illustrate this point, let us consider the components of accumulation and the profit rate. Let g , K , ΔK and s denote the rate of accumulation, the advances in constant capital (c) and variable capital (v) in terms of labor value, the accumulation of capital, and the surplus value, respectively. Assuming a turnover rate of capital of one, i.e., $K = c + v$, we get

$$g = \frac{\Delta K}{K} = \frac{\Delta K}{s}\frac{s}{K} = ar, \quad 0 \le a \le 1, \tag{3}$$

where $a = \frac{\Delta K}{s}$ and $r = \frac{s}{K}$ denote the capitalists' propensity to accumulate out of profits and the profit rate, respectively.[iii] Since capitalists can only invest what they have previously earned and retained and workers are assumed not to save, equation (3) implies the rate of accumulation to be determined by the profits retained by the capitalists. Hence, accumulation can only be affected via variations in the rate of profit (cf. Hein 2004, p. 69). In order to analyze the first-order impact of the wage rate on the profit rate, let us follow Hein (2004, p. 70) and Foley and Michl (1999, p. 25) by deriving the real wage-profit rate schedule. Let Y , $w = \frac{v}{L}$, L , $r = \frac{s}{K}$ and K denote value added, the real wage, the labor employed, the profit rate and the capital stock, respectively.[iv] Then, national accounting tells us that

$$Y = wL + rK. \tag{4}$$

Normalizing to one and solving for the profit rate leads us to

$$r = \left(1 - \frac{w}{y}\right), \tag{5}$$

where $y=\frac{Y}{L}$ is labor productivity and $v=\frac{Y}{K}$ is output in value terms related to capital in value terms, i.e., the output-capital ratio. Following Marx, we assume the economy to operate at the normal rate of capacity utilization and the potential output-capital ratio to remain constant implying the actual output-capital ratio (v) to be constant. Since we also assume constant labor productivity, the profit rate is determined solely by the real wage rate (w). Given a constant propensity to accumulate out of profits, equation (3) implies that also accumulation is solely determined by the wage rate.

Now, we can summarize the economic mechanisms at work which are described by equations (1), (2), (3) and (5): Taking technology as given, we start from an increase in employment. Real wages will rise due to increased bargaining power of workers. However, this will reduce the capitalists' profit rate and thus diminish accumulation. Hence, in the next round employment and thus the real wages will be lower. Profits and accumulation increase. So will employment and we are back at the beginning of the story. Consequently, there is only one set of employment, real wage, profit and accumulation rate that is consistent with equilibrium. However, this equilibrium is not necessarily stable (Hein 2004, p. 72).v

Accumulation and distribution with labor saving technological change: the crisis of over-accumulation

Assuming the technology to be independent of accumulation does not seem to meet Marx's essence. In fact, he puts a lot of emphasis on technological progress as a strategy of capitalists driven by the urge of profit maximization to reduce unit costs (Marx 1867, pp. 508-518). Hence, for Marx, a significant part of investment is carried out to save labor in the future. Thus, accumulation causes a relative decrease in employment:

> [I]n fact, it is capitalistic accumulation itself that constantly produces [...] a relatively redundant population of labourers, i.e., a population of greater extent than suffices for the average needs of the self-expansion of capital, and therefore a surplus-population. (Marx 1867, p. 630)

This surplus-population ensures that the wage claims of laborers are contained within limits. Hence, increasing real wages cannot be seen as necessarily eroding the profit rate, the source of accumulation, as they have done in the previous case with given technology (Anwar Shaikh 1978, p. 237). However, by no means does it imply that the profit rate cannot diminish due to other reasons and thus limit the speed of accumulation. In the orthodox interpretation of Marx, technological progress, which has just prevented real wages from being an impediment to profitability and accumulation, is in fact the very reason for crisis of profitability and accumulation in the long run. As Marx points out in his treatment of the law of the tendency of the rate of profit to fall (Marx 1894, chs. 13-15), technological progress, induced by the profit-seeking capitalists themselves and following a certain pattern which will be discussed below, is the ultimate cause of declining profitability and accumulation regardless of any distributional counter-influences, resulting in severe crises of capitalism in the long run.

In order to illustrate the impacts of technological progress on the rate of profit in the long run, let us reconstruct Marx's theory of the falling rate of profit. Consider the following factorization of the profit rate:

$$r=\frac{s}{K}=\frac{s}{Y}\frac{Y}{K}=hv\,, \tag{6}$$

where h and v are the profit share and the output-capital ratio, respectively. Let us now assume the profit share to converge towards one implying that $v=0$. Then r can be interpreted as the maximal profit rate (r^{max}) possible which depends merely on the output-capital ratio (v) which itself is solely determined by the potential output-capital ratio, as capacity utilization is held constant at its normal rate (Shaikh 1978, p. 233,

Hein 2004, p. 80).vi We get

$$r^{max} = \frac{Y}{K} = \frac{Y}{c}. \tag{7}$$

In order to show a long-run tendency of the profit rate to fall, we need to show that, for Marx, the "materialized composition of capital" (Shaikh 1987, p. 304), i.e., the constant capital-output ratio ($\frac{c}{Y}$), increases with technological progress. To do so, we split the ratio up into the organic composition of capital ($\frac{c}{v}$) and the output-variable capital ratio ($\frac{Y}{v}$) and divide both components by the wage (w) which yields the relation of the technical composition of capital (τ) and labor productivity (y) (cf. Shaikh 1987, pp. 304-310):vii

$$\frac{c}{Y} = \frac{\frac{c}{v}}{\frac{Y}{v}} = \frac{\frac{c}{L}}{\frac{Y}{L}} = \frac{\tau}{y}. \tag{8}$$

As can be seen from equations (7) and (8), technological progress will add up to a declining rate of profit only if it induces a higher increase in the technical composition of capital (τ) than in labor productivity (y) (cf. Hein 2004, p. 78 and Shaikh 1978, p. 234).viii This type of technical change has been called Marx-biased by Foley and Michl (1999, ch. 7). It implies a rising labor productivity accompanied by a declining capital productivity. This form of technological progress is not foreign to post-Keynesians (cf. Kaldor 1957). Thus, it shall not be an impediment in synthesizing Marxian and post-Keynesian economics .

Summing up, we can hold that, technical change for Marx is reflected in a decrease of the constant capital-output ratio, given the utilization of capital. This narrows the corridor in which the profit rate can develop. Since profits are the only source of investment, the corridor for accumulation necessarily squeezes as well. In the long run, technological progress will thus result in diminishing profitability and accumulation.ix

According to Marx, a falling rate of profit as such restrains accumulation, but does not immediately cause a crisis of capitalism. This is because accumulation may reduce the rate of profit, but still can increase the mass of profits for a considerable period of time. Marx derives the conditions for the mass of profits not to decline given a falling profit rate:

> Should the rate of profit fall by 50%, it would shrink one-half. If the mass of the profit is to remain the same, the capital must be doubled. For the mass of profit made at a declining rate of profit to remain the same, the multiplier indicating the growth of the total capital must be equal to the divisor indicating the fall of the rate of profit. (Marx 1894, p. 222)

To illustrate this point, note that equation (4) implies $s = rK$. From this and from the fact that the growth rate of the capital stock ($\hat{K}$) is equal to the rate of accumulation (g), we can infer that

$$\hat{s} = \hat{r} + \hat{K} = \hat{r} + g. \tag{9}$$

Provided the profit rate decreases over time, i.e. $\dot{r} < 0$, the level of surplus value will not decrease, i.e. $\dot{s} \geq 0$, only if accumulation is growing at a rate not less than the norm of the growth rate of the profit rate, i.e. $g \geq \left| r \right|$.

At some point, however, the profit rate will fall below the level at which the compensating effect of accumulation does not suffice anymore to increase the mass of profits. At this point, the expansion of capital advanced in production does not yield additional profits anymore:

> [A]t a point [...] when the increased capital produced just as much, or even less, surplus-value than it did before its increase, there would be absolute over-production of capital; i.e. the increased capital [K] $+ \Delta$ [K] would produce no more, ore even less, profit than capital [K] before its expansion by Δ [K]. (Marx 1894, p. 251)

Reconsidering the accumulation function of equation (3) shows that a decreasing profit rate will negatively affect accumulation. Even if the capitalists' propensity to accumulate out of profits (a) increases, a falling rate of accumulation associated with a declining rate of profits is inevitable as soon as a has reached one. Thus, labor saving technological progress will force the rate of profit to decline eventually to a point where accumulation does not cause an increasing volume of profits anymore. The economy will end up in a crisis of over-accumulation (cf. Shaikh 1983, p. 142).x

Based on this analysis, Marx concludes that the barrier for capitalist expansion lies in the logic of accumulation itself:

> The real barrier of capitalist production is capital itself. It is that capital and its self-expansion appear as the starting and the closing point, the motive and the purpose of production; that production is only production for capital and not vice versa, the means of production are not mere means for a constant expansion of the living process of the society of producers. (Marx 1894, p. 250)

Post-Keynesian critique of the orthodox interpretation of Marx

In the orthodox view, accumulation is not demand-constrained, as "capitalists are driven to accumulate as rapidly as possible, so that self-expanding reproduction, not stagnation, is the normal tendency of the system" (Shaikh 1978, p. 231). Rather, it is implicitly truncated by the availability of savings. Analysis is made in real terms, since "in reality it is the total labor times (labor values) involved in the production of commodities which regulate the money phenomena." (Shaikh 1978, p. 232). Coherently, wages are assumed to be bargained in real terms. Hence, distribution is determined prior to the production process. Together with technology it determines accumulation.

Considering the age Marx lived in which was characterized by rapid capitalist expansion and entrepreneurs eager to invest whenever getting hold of the required funds, his disregard of the role of aggregate demand at this level of abstraction is understandable. Being concerned with the mechanics of today's mode of capitalist accumulation, however, this orthodox interpretation, even as a long-period analysis, lacks explanatory power from a post-Keynesian perspective. As we want to point out here, the main reason for this is that the economic mechanism set forth by orthodox Marxians are hardly consistent with the mechanism

identified by post-Keynesians, even for the long run.

Hein (2004, pp. 73-74, pp. 84-87) raised two central issues which are problematic from a post-Keynesian perspective: First, production is perceived as never facing realization problems on the goods market. This is no surprise, as only real variables are considered. Hence, this view is not consistent with the post-Keynesian perception of a monetary economy: For post-Keynesians, it is nominal variables driving the economy in both the short and the long run, not real ones. Thus, distribution is not determined by bargaining over real wages contrary to what has been argued in the model, but by a two step procedure of negotiating nominal wages on the labor market and pricing in the goods market. Assuming away money means ignoring the possibility of money being hoarded and the possibility of investment being financed by endogenously created loans independent of available savings. Contrary to the model outlined above, in a money economy, the path of accumulation is not uniquely determined given the distribution of income and production technology.

Second, although Marx heavily criticized Say's law on many occasions, as we shall argue below, his theory of crisis of over-accumulation relies on its validity in the long-run, since there is not role to play for aggregate demand. The restriction that accumulation can only be financed by previous saving out of profit ensures that the rate of accumulation declines with a decreasing profit rate. If one allows accumulation financed by credit, the theory will break down. As a consequence of the introduction of money, distribution and the mass of profits will be determined as a residual in the goods market in the course of price determination. Thus, there is no reason left, why the mass of profits should necessarily decrease as a result of falling profit rates (cf. Hein 2004, pp. 84-87).

4. An alternative view: money and effective demand in Marx's reproduction schemes

In this section, we will discuss Marx's (1885, chs. 20, 21) notion of effective demand which he illustrates in his schemes of simple and expanded reproduction. He launches a severe attack on Say's law which he perceives as the proposition "that overproduction is not possible or at least that no general glut of the market is possible" (Marx 1861-63, p. 705). He shows that aggregate demand will generally be insufficient to meet aggregate supply which may cause a crisis of over-production.

Effective demand in Marx's scheme of expanded reproduction

Marx's (1885, chs. 20, 21) discussion of the reproduction process of capital is very extensive. We want to concentrate on those concepts that are most relevant for our endeavor to address the relevance of effective demand in Marx.xi

Marx's (1885, p. 25) illustrates the circuit of the individual money capital by $M-C\ldots P\ldots C'-M'$. Money is transformed into variable and constant capital. If consumed productively by the capitalist it transforms into commodities which bear a surplus-value and can be sold on the market for an amount of money that exceeds the initial money investment. For the aggregate, this can be modeled by the following system of equations (Foley 1986, pp. 69-71): In each time period t, Marx distinguishes between aggregate financial capital ($F(t)$), aggregate productive capital ($N(t)$) and aggregate commercial capital ($X(t)$), each changing over time by

$$\frac{\partial N(t)}{\partial t}=C(t)-P(t), \tag{10}$$

$$\frac{\partial X(t)}{\partial t}=P(t)-S'(t), \tag{11}$$

$$\frac{\partial F(t)}{\partial t} = S'(t) - pS''(t) - C(t), \tag{12}$$

where

$$P(t) = C(t - T_P), \tag{13}$$

$$S(t) = S'(t) + S''(t) = P(t - T_R) + qP(t - T_R), \tag{14}$$

with $S'(t) = P(t - T_R)$ and $S''(t) = qP(t - T_R)$,

$$C(t) = S'(t - T_F) + pS''(t - T_F). \tag{15}$$

$C(t)$, $P(t)$, and $S(t)$ denote the flows of costs, finished products and sales, respectively, each in value terms and at time t. $S'(t)$ and $S''(t)$ denote the part of sales recovering the costs of production and the surplus value, respectively. T_P, T_R and T_F are the time delays in production, sale and finance, respectively. Y and p denote the mark-up on costs and the capitalization rate (specifying the share of surplus value that is reinvested), respectively.

Following Marx's (1885, pp. 493-527) idea of an expanding economy, we assume this circuit and with it all the stocks and flows to grow by a rate g. In order to compare this model with the orthodox interpretation of Marx, we now want to establish a relationship between the accumulation rate (g) and the profit rate (r). To do so, recall that the rate of profit in value terms relates the surplus value ($S''(t)$) to the capital tied up in production ($F(t) + N(t) + X(t)$). Since all these variables grow at a rate (g) and since the capitalization rate (p) determines the part of the growing surplus value that is contributing to accumulation in the next period, we get the Cambridge Equation (Foley 1986, p. 76),

$$r = \frac{S''(t)}{F(t) + N(t) + X(t)} = \frac{g}{p}. \tag{16}$$

Recalling equation (3) reveals that the capitalization rate (p) is equal to the propensity to accumulate out of profits (a) of the previous section. However, the interpretation of the formally identical equations regarding causality is different. Whereas, in the previous section, the set-up of the model implied an ex ante determination of investment through savings, this is not the case in the present framework. As Kalecki (1968) shows for an economy comprising three departments of production, it is the capitalists' decisions to invest and

to consume that determine, ex post, profits and thus savings provided workers do not save.xii

In order to illustrate Marx's view on the immediate causes of a potential demand gap, suppose that workers' and capitalists' consumption spending is delayed by T_C (Foley 1983a, p. 25). This can be interpreted as saving or hording a certain amount of money. Let k denote the fraction of variable capital in total capital advanced. Then, in period t, aggregate demand ($D(t)$) comprises the capitalists' demand for means of production ($(1-k)C(t)$), the capitalists' demand for consumption ($(1-p)S''(t-T_C)$) and the worker's demand for consumption ($kC(t-T_C$),

$$D(t)=(1-k)C(t)+(1-p)S''(t-T_C)+kC(t-T_C). \tag{17}$$

Since all variables grow by g, substituting equation (15) into (17) yields

$$D(t)=(1-k)[S'(t)+pS''(t)]e^{-gT_F}+(1-p)S''(t)e^{-gT_C}+k[S'(t)+pS''(t)]e^{-g(T_C+T_F)} \tag{18}$$

Provided the economy is expanding, i.e. $g>0$, a time lag in financing investment ($T_F>0$) and/or a time lag in consumption ($T_C>0$), both of which can be interpreted as hoarding money, result in a demand gap, as $D(t)<S(t)$ (cf. Foley 1983a; 1986, pp. 86-89). This lack of aggregate demand is strongly reminiscent of Keynes notion of effective demand, which is also influenced by the propensity to save.

In order to close this demand gap, capitalists are required to either increase their holdings of gold (in a commodity money economy) or increase borrowing (in a credit money economy), such that aggregate demand equals aggregate supply.xiii This implies that, in a growing economy, investment must be higher than what retained profits would allow for.

Accumulation and credit in Marx's monetary analysis

The fact that aggregate demand generally does not match aggregate supply in a growing economy bears momentous consequences for the explanation of accumulation. Causality cannot run from savings to investment, as it is assumed in the orthodox interpretation, since, ex ante, investment needs to be higher than available savings in order to maintain growth. Consistently, Marx argues that

> [i]f [...] through any circumstance or combination of circumstances, the market-prices of the commodities [...] fall far below their cost-prices, then reproduction of capital is curtailed as far as possible. Accumulation, however, stagnates even more. Surplus-value amassed in the form of money (gold or notes) could only be transformed into capital at a loss. It therefore lies idle as a hoard in the banks or in the form of credit money, which in essence makes no difference at all. (Marx 1861-63, p. 705)

Taking this quote seriously, accumulation cannot be seen as a mere function of available savings. Expectations on future profitability play a role. If prospects are dismal, capitalists will hoard money. As we will argue below, there is no endogenous rate of interest rate equilibrating supply and demand for loanable funds in Marx' view. Rather, the interest rate is determined by institutional factors. Thus, investment needs to be explained

independently of available savings and profits need to be explained by investment. Unfortunately, Marx does not present a theory of investment decisions which is, however, no surprise considering the age he lived in. Rapid economic expansion made investment seem to be restricted merely by the availability of funding.

Marx's theory of effective demand necessarily implies a monetary theory of the capitalist mode of production. As has been argued by Hein (2004), contrary to the orthodox interpretation of Marx, analysis has to be carried out in monetary, not in real terms. In particular, Marx's understanding of effective demand is built on a specific understanding of money.

For Marx, the ultimate reason for a crisis of over-production is money itself. Marx (1867, ch. 3) points out that as a distinct feature of commodity production compared to pure barter economies, money functions as a means of circulation and thus implies the separation of purchase and sale (Matthews 1996, pp. 65-70). While in a barter economy the transaction $C-C$ ensures that every sale is associated with a correspondent purchase thus realizing the value of someone else's production, this is not the case in a monetary economy in which every commodity undergoes the metamorphosis $C-M-C$ comprising a sale $C-M$ and a purchase $M-C$ (Marx 1867, pp. 103-114). There is no need for immediate purchase, once a producer has sold her commodities.xiv

The separation of purchase and sale and thus commodity production as such would not be possible, if money did not exhibit another essential feature, namely to function as a store of value (Marx 1867, pp. 130-134). As a "universal representative of material wealth" (Marx 1867, p. 133) it can be withdrawn from circulation, in principle without losing value or purchasing power, thus allowing sellers of commodities to simply hold money as an asset without severe loss. However, as soon as sellers start hoarding money for whatever reason, which we have also considered in Marx's reproductions schemes, some producers will find themselves in trouble to realize their commodities and fail to meet their debt obligations which may give rise to a crisis of over-production (Matthews 1996, pp. 70-74).xv Thus the very nature of the capitalist mode of commodity production which involves the existence of money as a means of circulation and as a store of value is the origin of crisis.xvi

The independence of investment from available savings which we assume Marx to have had in mind in the passages covered in this section requires a supply of endogenously determined credit money. In Marx's work, there can be found at least two passages which outline precisely such a theory.

First, in his treatment on money, Marx (1867, pp. 134-142) explores the function of money as a means of payment which allows commodity exchange to deviate from the standard metamorphosis $C-M-C$. Commodities may be purchased prior to the payment of money or prior to the sale of commodities: "the alienation of commodities becomes separated, by an interval of time, from the realization of their prices" (Marx 1867, pp. 134-135). Creditor-debtor relationships emerge which necessarily imply the existence of a credit money system (Matthews 1996, pp. 74-76).

Second, Marx's (1894, ch. 25) discussion of commercial and bank credit also reveals a conception of endogenous credit money.xvii That the money supply is not limited by loanable funds in Marx's view becomes obvious in the following passage:

> The credit given by a banker may assume various forms, such as [...] bank-notes of the bank itself. [...] This last form of credit appears particularly important and striking to the layman, first because this form of credit-money breaks out of the confines of mere commercial circulation into general circulation, and serves there as money; and because in most countries the principal banks issuing notes [...] actually have the national credit to back them, and their notes are more or less legal tender; because it is apparent here that the banker deals in credit itself, a bank-note being merely a circulating token of

> credit. (Marx 1894, pp. 403-404)

Thus, Marx is highly consistent with a theory of independent investment demand being financed by newly created credit money. Marx's (1894, pp. 359-369) view on the rate of interest is also consistent with that. For him, the rate of interest does not adjust in order to equilibrate investment and savings on the market for loanable funds. Rather than that, it is influenced by the money market and does not gravitate around a natural rate. According to Marx (1894, p. 370), it is strongly affected by the relative power of financial and industrial capitalists who have a conflict on the distribution of the surplus value in interest and profit of enterprise (cf. Hein 2004, pp. 23-26).

The crisis of over-production which has been outlined in this section is fundamentally different from the crisis of over-accumulation previously discussed. In fact, the alternative view on Marx which sees investment as a rather independent variable that is not restricted by available savings does not allow for a predetermined accumulation path in any direction. Accumulation is driven by effective demand.

A post-Keynesian assessment of Marx's reproduction schemes and monetary analysis

Marx's thoughts on the creation and circulation of money and on its connections to the reproduction and accumulation process of capital is not always fully consistent.[xviii] Marx also leaves open some essential questions such as the determination of independent investment demand as the driving force of accumulation or the mechanism through which savings adjust to investment.

Nevertheless, in parts of Marx's work focused on in this section, there are substantial access points for post-Keynesian economic theory. Emanating from the rejection of Says law, Marx proves the possibility of a general glut, the importance of effective demand for realizing production, and thus the independence of accumulation from available savings. The monetary form of capitalist relations is an essential ingredient in this theory of crisis: As a store of value, money allows for the withdrawal of money from circulation by hoarding, which has been a core argument in Keynes (1936) attack on Say's law. As a means of payment, it implies a modern credit money system, in which commercial banks accommodate demand for loans at an interest rate that is mainly determined by institutional factors. As Marx shows in his reproduction schemes, credit is a basic requirement for capitalist production.

The monetary interpretation of Marx presented above bears another implication which is also highly consistent with post-Keynesian economics. For Marx (1867, p. 97-8), money as a standard of price implies that the value of money is determined institutionally. As argued by Foley (1983b), the value of money depends on the price setting of firms which in turn depends on accumulation and class struggle. This also implies that the real wage rate and thus distribution are neither technologically given nor determined on the labor market as assumed in the orthodox view. Rather than that, in a first step nominal wages are negotiated and then prices are determined (cf. Hein 2004, p. 10).

In the monetary interpretation of Marx, neither the rate of capacity utilization nor the distribution of income are given a priori, due to the importance of effective demand and of bargaining power for wage determination, respectively. Thus, given the propensities to save out of wages and distributed profits, we can now close the model by either assuming a constant rate of capacity utilization or an exogenously determined distribution of income.

In the first variant which takes the utilization of capacity and thus demand as given, the autonomous accumulation decisions of capitalists will induce an appropriate amount of savings via a change in the distribution of income. An increase in investment will raise demand and thus prices. Given nominal wages, real wages will increase and income will be redistributed from wages to profits. Assuming that the propensity to save out of profits is higher than out of wages, the amount of savings will rise according to the initial rise in investment. This is exactly the economic reasoning of Kaldor's (1957) full employment growth model (cf. Hein 2004, p. 10).

The second variant takes distribution as given which may be a consequence of price setting power of firms. In this case, a rise in accumulation will increase aggregate demand and thus capacity utilization. An additional stream of income is generated which, given the distribution of income, will induce an additional amount of savings equal to the initial rise in investment. Again, this line of argument can be associated with a

growth model of one of the founding fathers of post-Keynesian economics, namely with Kalecki (1971, ch. 15).

To sum up, the monetary interpretation of Marx is very compatible to core features of post-Keynesian economics. Marx notions of effective demand and endogenous money give rise to a perception of the economic mechanisms leading to economic growth which are highly consistent with different currents of post-Keynesian accumulation and distribution models.

5. Concluding remarks

In order to contribute to the ongoing convergence of Marxian and post-Keynesian approaches, this paper set out to contrast two converse interpretations of Marx, an orthodox interpretation based on real analysis and an alternative interpretation based on monetary analysis, and assess their compatibility to the post-Keynesian economic framework. As we have argued, Marx is a considerably better post-Keynesian in his monetary than in his real analysis.

In particular, in the sections where he derives the general law of capitalist accumulation (Marx 1867, pp. 612-712) and the law of the tendency for the rate of profit to fall (Marx 1894, chs. 13-15), Marx abstracts from money and assumes Say's law to hold. Effective demand does not play a role. The economy is constrained by the supply side, in particular, by the amount of available savings accruing out of profits. Two cases are distinguished regarding the role of technological progress. In the first case, technological progress is assumed away. The economy implicitly grows along a path determined by the growth of the labor force in circular movements that are due to the interaction of accumulation, profits, real wages and employment. In the second case, labor saving technological progress is the ultimate trigger of crisis of over-accumulation. Accumulation induced technological change reduces the amount of labour time embodied in production causing the rate of profit irresistibly to decline in the long run. Since accumulation is restricted by profits previously earned, the economy will end up in a crisis of over-accumulation, in which accumulation does not suffice anymore to raise the mass of profit. Post-Keynesians strongly object this view, as they emphasize the role of effective demand, independent investment and money, each of which is not regarded as important in the orthodox view.

However, many passages in Marx's work present a view on the economy that highly regards of demand, investment and money, in particular, Marx's treatment of the reproduction and circulation of the aggregate social capital (Marx 1885, chs. 20, 21), his analysis of money (Marx 1867, ch. 3) and of credit (Marx 1894, ch. 25) and explicitly his rejection of the Ricardian version of Say's law (Marx 1861-63, ch. 17). In his model of expanded reproduction of capital, Marx shows that in a commodity producing economy, money (being a consequence of the very logics of this mode of production) is the trigger of a general glut and thus of a crisis of over-production. Money allows for the separation of purchase and sale as a means of circulation and for the extension of this gap as a store of value. As a means of payment, money implies its endogenous creation through lending. The possibility of a lack of effective demand and the endogeneity of money allow accumulation to be independent of the availability of savings. Thus, the notion of effective demand, independent investment and endogenous money implied in these sections of Marx's work perfectly match the post-Keynesian perceptions.

Thus, it is not just through Kalecki that the post-Keynesian research program is influenced by Marx. Many concepts important to this school can be found in Marx himself. He, thus, may well be regarded as one of its founding fathers.

REFERENCES

DUMÉNIL, GÉRARD AND LÉVY, DOMINIQUE (1999): Being Keynesian in the short term and classical in the long term: The traverse to classical long-term equilibrium, The Manchester School, 67(6), pp. 684-716.

EICHNER, ALFRED S., KREGEL, JAN A. (1975): An Essay on Post-Keynesian Theory: A New Paradigm in Economics, Journal of Economic Literature, 13(4), pp. 1293-1311.

FOLEY, DUNCAN K. (1983A): On Marx's Theory of Money, Social Concept, 1(1), pp. 5-19.

FOLEY, DUNCAN K. (1983B): Say's law in Marx and Keynes, Cahiers d'Economie Politique, 10/11, pp. 183-194.

FOLEY, DUNCAN K. (1986): Understanding Capital. Marx's Economic Theory, Harvard University Press, Cambridge, London.

FOLEY, DUNCAN K., MICHL, THOMAS R. (1999): Growth and Distribution, Harvard University Press, Cambridge, London.

GLYN, ANDREW, SUTCLIFFE, ROBERT B. (1972): Capitalism in Crisis, Pantheon, New York.

GOLDSTEIN, JONATHAN P. (2008): Heterodox Macroeconomics: Crotty's Integration of Keynes and Marx, Review of Radical Political Economics, 40(3), pp. 300-307.

GOODWIN, RICHARD M. (1967): A growth cycle, in: Feinstein, Charles H., ed., Capitalism and Economic Growth, Cambridge University Press, Cambridge, pp. 54-58.

GORDON, DAVID M. (1995): Putting the horse (back) before the cart: disentangling the macro relationship between investment and saving, in: Epstein, Gerald A., Gintis, Herbert, eds., Macroeconomic Policy after the Conservative Era. Studies in Investment, Saving and Finance, Cambridge University Press, Cambridge, pp. 57-108.

HARVEY, JOHN T., GARNETT, ROBERT F., EDS. (2008): Future Directions for Heterodox Economics, University of Michigan Press, Michigan.

HEIN, ECKHARD (2004): Money, credit and the interest rate in Marx's economics. On the similarities of Marx's monetary analysis to post-Keynesian approaches, International Papers in Political Economy, 11(2), pp. 1-43.

KALDOR, NICHOLAS (1957): A model of economic growth, Economic Journal, 67, pp. 591-624.

KALECKI, MICHAL (1968): The Marxian equations of reproduction and modern economics, in: Osiatynski, Jerzy, ed., Collected Works of Michal Kalecki, Oxford University Press, 1991, Oxford, vol. 2.

KALECKI, MICHAL (1971): SELECTED Essays on the Dynamics of the Capitalist Economy, Cambridge University Press, Cambridge.

KEYNES, JOHN M. (1936): The General Theory of Employment, Interest and Money, Macmillan, London.

LAVOIE, MARC (1992): JACQUES Le Bourva's theory of endogenous credit-money, Review of Political Economy, 4(4), pp. 436-446.

MARX, KARL (1861-63): Theories of Surplus Value, Progress Publishers, 1963, Moscow.

MARX, KARL (1867): Capital. A Critique of Political Economy, vol. I, Foreign Languages Publishing House, 1954, Moscow.

MARX, KARL (1885): Capital. A Critique of Political Economy, vol. II, Progress Publishers, 1956, Moscow.

MARX, KARL (1894): Capital. A Critique of Political Economy, vol. III, Progress Publishers, 1959, Moscow.

MATTHEWS, PETER. H. (1996): The modern foundations of Marx's monetary economics, The European Journal of the History of Economic Thought, 3(1), pp. 61-83.

NELL, EDWARD J. (1996): Making Sense of a Changing Economy: Technology, Markets and Morals, Routledge, London, New York.

ROBINSON, JOAN V. (1956): Accumulation of Capital, Macmillan, London.

ROCHON, LOUIS-PHILIPPE. (1999): Credit, Money and Production, Edward Elgar, Cheltenham, Northampton.

SHAIKH, ANWAR (1978): An introduction to the history of crisis theories, in: Union for Radical Political Economy, ed., US Capitalism in Crisis, New York, pp. 219-241.

SHAIKH, ANWAR (1983): Economic crisis, in: Bottomore, T., ed., A Dictionary of Marxist Thought, Harvard Universtiy Press, Cambridge, pp. 138-143.

SHAIKH, ANWAR (1987): Organic composition of capital, in: Eatwell, John, Milgate, Murray, Newman, Peter, eds., The New Palgrave. A Dictionary of Economics, Palgrave Macmillan, Basingstoke, pp. 755-757.

SHAPIRO, NINA (1977): The Revolutionary Character of Post-Keynesian Economics, Journal of Economic Issues, 11(3), pp. 541-560.

WILLIAMS, MICHAEL (2000): Why Marx neither has nor needs a commodity theory of money., Review of Political Economy, 12(4), pp. 435-451.

[i] See, for example, Goldstein (2008) for an overview on the attempts to integrate Marxian and Keynesian economics.

[ii] This view is not undisputed among post-Keynesians. For example, Duménil and Lévy (1999) make a case for Classical mechanism in the long term and Keynesian/Kaleckian mechanism in the short term. To me and to many others such as Eichner and Kregel (1975), however, the principle of effective demand is the core concept of Keynesian economics and cannot be dropped in long-run analysis.

[iii] Note that in Marx's work the capital stock also includes the advances for labor.

[iv] For simplicity, we assume the labor values of capital and consumer goods to be equal to one.

[v] This mechanism leading to cyclical movements of the economy around its growth path have been formally elaborated by Goodwin (1967).

[vi] Note that $Y = s$ since $v = 0$.

[vii] This is because $v = Lw$ and we assume for simplicity that the average labor values of all capital and consumption goods are equal which implies that the organic composition of capital is the quotient of the technical compositon of capital and the wage rate, i.e. $\frac{t}{v}$.

[viii] As Hein (2004, p. 77) points out, also the reaction of each of the average labor values of the capital goods in production and of the overall output to technological progress contribute to the rise of the organic composition of capital. This is because an increase in labor productivity in period t reduces the average value of the overall output produced in period t (flow), but not the average value of the capital goods produced in period $t - i$ with $i > 1$ (stock).

[ix] For Marx it is clear that the

> [capitalist] mode of production produces a progressive relative decrease of the variable capital as compared to the constant capital, and consequently a continuously rising organic composition of the total capital. The immediate result of this is that the rate of surplus-value, at the same, or even a rising, degree of labour exploitation, is represented by a continually

falling general rate of profit. (Marx 1894, pp. 212-213)

x The *crisis of over-accumulation* is just one possible crisis based on an erosion of profits. Some Marxian authors reject the view that the profit rate necessarily decreases in the long run. However, they share the view that crisis in capitalism are due to diminishing profits, for whatever reason, but most prominently due to raising labor income shares that lead to a *profit squeeze*. This is because, accumulation is still seen as being fed and restricted by savings out of profits (cf. Glyn and Sutcliffe 1972)

xi We want to follow Foley (1983a) by not considering Marx's (1885, p. 399) distinction of producer goods and consumer goods industries as this would not contribute to understanding the concept of effective demand in Marx's reproduction schemes.

xii The modern distinction between *ex ante*- and *ex post*-equilibration of investment and savings was foreign to Marx. This is why the causalities implied in most of the writings relevant for our survey are not obvious.

xiii This is precisely the conclusion drawn by Marx who, assuming money to be commodity money, argues that

> [t]he $v+s$ of the producer of gold does not enter into II [consumer goods industry] only to the extent that he [average capitalist in the consumer goods industry] accumulates surplus-value or converts it into means of production I, i.e., to the extent that he expands his production. (Marx 1885, p. 526)

xiv As Marx's points out,

> [t]he difficulty of transforming the *commodity* - the particular product of individual labour - into its opposite, money, i.e., abstract general social labour, lies in the fact that *money* is not the particular product of individual labour, and that the person who has effected a sale, who therefore has commodities in the form of money, is not compelled to buy again at once, to transform the money again into a particular product of individual labour. (Marx 1861-63, p. 713)

xv Hein (2004, p. 12) argues that the aggregate demand reducing effects of hoarding money are only valid, as

long as the money considered is not money that needs to be produced, i.e. commodity money. The reason is that an increase in money hoards increases the demand for the money commodity which compensates the reduction of demand triggered by the money hoards initially accumulated. Thus, Marx who usually assumed gold as money is not fully consistent. However, for Michael Williams (2000) Marx assumed commodity money (gold) merely out of convenience.

[xvi] In this vain, Marx notes that

> [t]he general nature of the metamorphosis of commodities - which includes the separation of purchase and sale just as it does their unity - instead of excluding the *possibility* of a general glut, on the contrary, contains the possibility of a general glut. (Marx 1861-63, p. 711)

[xvii] Again, this analysis focuses on the function of money as a means of payment, "i.e., commodities are not sold for money, but for a written promise to pay for them at a certain date" (Marx 1894, p. 400)

[xviii] For example, Marx's notion of credit money seems to contradict his notion of commodity money which he applies in the schemes of reproduction (Williams 2000).