How Can Keynes' Theory of Interest Withstand Sraffa's Criticism?

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Background

- Chapter 17 of the *General Theory* was intended to make clear what makes money so unique among various assets and what gives the money rate of interest such a particular role in determining the level of employment (GT p.222).
- In the chapter Keynes employed the concept of own-rates of interest for various commodities, which he attributed Sraffa.
- But Sraffa left a note on this chapter that reveals he was quite critical of Keynes' theory (Sraffa Papers I100).
- Ranchetti (2001) accepted Sraffas' critique and concluded that in spite of the discrepancy, the two scholars have a common vision: the money rate of interest given outside the production system. (Ranchetti 2001, p.327)
- Kurz (2010) agreed with Sraffa and stated:
  - 'in chapter 17, Keynes did not reason correctly and got entangled in a maze of contradiction' (Kurz 2010, p.,201)
  - Keynes's argument 'suffers from neglecting the implications of flexible prices via the value of money for the level of the "own rate of money interest" '. (idem, p.202)

The Aim of This Study Is to Reveal the Following Things:

- Sraffa misunderstood Keynes' theory, and Keynes' utilization of the concept of own-rate of interest can withstand Sraffa's criticism.
- In order to reach that recognition, it is necessary
  - to make clear the difference between Sraffa's and Keynes' concepts of equilibrium, and
  - to abandon a prevailing interpretation of Keynes' argument that the spot or present price of an asset is its demand price and that the forward or future price of an asset is its normal supply price.
- Sraffa's view is shared by Kaldor (1960), Barens and Caspari (1997), and Lawlor (1996, 2006), although those authors have not referred to Sraffa's note.
- Keynes described in chapter 17 an equilibrium with unemployment in a structurally changing economy, and in order to do so he employed Sraffa's concept of commodity-rates of interest.
- This interpretation will support Pasinetti's idea (2007) about the Keynesian revolution.

Sraffa's Critique (as Described by Ranchetti (2001))

1. On the concept of liquidity preference (I will not deal with this)
   Liquidity preference is nothing but utility of hoarding money, but diminishing marginal utility of money does not exist.
2. On Keynes' utilization of the concept of own-rate of interest and confusion of it with marginal efficiency of capital
   - The three definitions of own-rate of interest
   (1) $1 - \dfrac{p_f}{p_s} + r$ (p_f: forward (future) price, p_s: spot (present) price, r: money rate of interest)
   (2) $q - c + l$ (q: yield, c: carrying cost, l: liquidity premium, all measured in terms of the asset itself; i.e. 'advantage' of holding the asset)
   (3) $q - c + l + a$ (a: expected appreciation of the asset in terms of money; 'commodity-rate of money-interest')

   Sraffa accepts the first one, but rejects the others. (Ranchetti 2001, p.322)

Sraffa's Critique of Keynes' Concept of Own-Rate of Interest

- The difference in the rates of interest of various commodities comes from the difference in the rate of change in their prices, not from the difference in the advantages of them as Keynes said. (Ranchetti 2001, p.322-323)
- Keynes assumed people borrow a commodity in order to hold it and to enjoy its advantages, but actually people borrow money for the purpose of spending it on other commodities.
- Keynes' main conclusion that because of the special characteristics of money the money rate of interest is more reluctant to fall relatively to the own-rates of interest of the other assets would be self-contradictory. (Ranchetti 2001, p.323)

The 'Contradiction' in Keynes' Argument Pointed Out by Sraffa

- If there is one article the marginal efficiency of which never fall below say 5% (this being the valuation of the pleasure people derived from hoarding any quantity of it) the production of all other durable assets will stop when their stocks are such that marginal efficiency has come down to that level — for otherwise they could not be sold at cost— and all resources saved will be used for producing the hoardable asset. If this asset cannot be produced (paper money), its demand will increase and can only be met by a continuous rise in its value, i.e. fall in general prices. If this hoarding is expected to go on steadily, and all prices are expected to fall in terms of money, the result will be that all own rates of interest of commodities will be higher than the money rate (this is Fisher's case: and the expected appreciation or depreciation is the only possible cause of divergence in rates of interest).

  Thus in the Keynes case, the result on rates of interest is opposite to Keynes' conclusion. (SP I100, p.11)

What the 'Contradiction' Means in Relation to Keynes' Conclusion in Chapter 17

- The main conclusion of chapter 17 is that
  - the own-rate of interest for money is likely to be the most reluctant to fall because the marginal efficiency of money, or liquidity premium, is reluctant to fall owing to the inelasticity of production and substitution, and
  - this characteristic gives the money-rate of interest the particular role in determining the level of employment; i.e. the own-rate of interest for money will stop the production of other assets if the marginal efficiency of those assets declines, whereas the increased demand for money cannot increase employment.
- Sraffa was against this argument and pointed out when the liquidity premium is reluctant to fall and demand goes to money, prices of other assets are expected to fall, which means the own-rate of interest for those assets are higher than the money-rate of interest.

Is Keynes' Argument Self-Contradictory? (1)

- Given the own-rate of interest is defined as $1 - \dfrac{p_f}{p_s} + r$, when $p_f < p_s$, it follows $1 - \dfrac{p_f}{p_s} + r > r$, which confirms Sraffa's argument.

- But it does not contradict Keynes' conclusion. The left-hand side of this inequality represents the own-rate of interest in terms of the asset itself. What matters for Keynes is the own-rates of interest for various assets *in terms of money* in relation to the money-rate.

- What matters for Keynes is the state, $1 - \dfrac{p_f}{p_s} + r + a \leq r$.

- So it seems Keynes' argument can easily escape Sraffa's critique...

Is Keynes' Argument Self-Contradictory? (2)

- But, since $a = \dfrac{p_f}{p_s} - 1$, the above inequality turns out to be $-a + r + a \le r$, or $r \le r$, which is a meaningless or contradictory formula.
- In order for Keynes' argument not to be meaningless or contradictory, we have to use the 'third definition' of the own-rate and say (assuming $l = 0$ for the assets other than money)

  when $q - c + a > r$, investment will progess, but as the stock increases, the left-hand side will fall, while the right-hand side is reluctant to fall because of the reluctancy of l for money to decline, thus investment will stop when $q - c + a$ becomes equal to r.
- In the equilibrium, where further investment does not take place, $q - c + a = r$. Since $a = \dfrac{p_f}{p_s} - 1$, $q - c = 1 - \dfrac{p_f}{p_s} + r$; i.e. the own-rate of interest in terms of the asset itself becomes equal to $1 - \dfrac{p_f}{p_s} + r$.

The 'First Definition' Was Not a Definition.

- $1 - \dfrac{p_f}{p_s} + r$ was not a definition of the own-rate of interest. Only $q - c$ is the defintion of the own-rate of interest in terms of the asset itself, and $q - c + a$ is the definition of the own-rate of interest in terms of money.

- Only in equilibrium $1 - \dfrac{p_f}{p_s} + r$ becomes equal to the own-rate of interest $q - c$. $q - c = 1 - \dfrac{p_f}{p_s} + r$ is not an identity, but an equation that is kept only in equilibrium.

- Keynes wrote at the beginning of chapter 17 as if $1 - \dfrac{p_f}{p_s} + r$ were a definition. That was misleading.

- Sraffa insisted that the difference in the own-rate of interest comes only from the difference in the rate of expected price change, but according to Keynes' definition, the difference in the own-rate of interest comes only from the difference in the advantage of various assets.

Why Did Sraffa Find a Contradiction in Keynes's Logic?

- Sraffa knew that Keynes thought $q - c + a = r$, not $q - c = r$, is met in his equilibrium. Why did Sraffa find a contradiction in Keynes' logic? He notes:

    In Section II Keynes tries to build up the rate of interest of each commodity by adding up the advantages and disadvantages of holding that particular article. On p.226-7 he defines them as the own rates!! [By this process he gets different results for each article: then, he must assume that for each of the articles there is such an expectation of appreciation or depreciation in terms of an arbitrary standard, as will equalise their rates of interest. The result is a hybrid "own rate of money interest" which is never used again, and indeed has no other use than to patch up the confusion created.] (SP I100, p.9)

Sraffa's Recognition Underlying His Critique (1)

- Also
  - Pages 227-8 Keynes supposes that the expectation of change in price must be added to the alone advantages in order to obtain the rate of interest of each article: and since he says that in [arbitrage-] equilibrium the rates of all articles must be equal, it follows that at any moment the expectation of fall in price must be "complementary" (directly related to) the advantages to be obtained by possession! (SP I100, p.10)
  - Sect I, Commodity rates. OK as far as it goes, but irrelevant subsequent use to confuse issue
    Note that they are important only in the short period (short loans) till production is adjusted to demand. (SP I100, p.6)

Sraffa's Recognition Underlying His Critique (2)

- And
  - If one asset has higher efficiency equilibrium is restored either (or both) by
    and as a result ② increasing production or ① rise in value. (SP I100, p.6)
  - Different rates can only be for short loans. As from a year hence probably all equal. But to produce an asset takes time; and to it only the "year hence" rates are relevant. (SP I100, p.8 back)

Sraffa's Two Concepts of Equilibrium

- Arbitrage-equilibrium and production-equilibrium
- Sraffa regarded Keynes' equilibrium in chapter 17 as arbitrage-equilibrium.
- Concerning 'highest rate rules the roost'

Sraffa's comment	Keynes' description
Simple Statement (p.223) Clear but wrong (corrected later, 236) (SP I100, p.8)	For it may be that it is the *greatest* of the own-rates of interest (as we may call them) which rules the roost (because it is the greatest of these rates that the marginal efficiency of a capital-asset must attain if it is to be newly produced); and that there are reasons why it is the money-rate of interest which is often the greatest (because, as we shall find, certain forces, which operate to reduce the own-rates of interest other assets, do not operate in the case of money). (Keynes 1936, p.223)
Abstruse statement (p.236)—in light of definition p.224 Formally correct, but meaningless (SP I100, p.8)	No further increase in the rate of investment is possible when the greatest amongst the own-rates of own-interest of all available assets is equal to the greatest amongst the marginal efficiencies of all assets, measured in terms of the assets whose own-rate of own-interest is greatest. (*ibid.*)

Why Did Sraffa Regard GT p.223 as Wrong, and p.236 as Meaningless?

- On p. 223 Keynes argues the greatest of the own-rates of interest rules the roost, just after pointing out that the own-rates of various commodities can be different from the money-rate and from each other because of the difference in the rate of price change. Sraffa must have thought the own-rates of various commodities could be greater or smaller than that of money because of the variety in the rates of price change, and the money-rate has no tendency to be the greatest.

- On p. 236, comparison is made between the greatest of the own-rates of interest and the own-rates of various assets in terms of the asset which has the greatest rate, but since in the arbitrage equilibrium, all the own-rates in terms of any common standard are equalized by price adjustment, i.e. the change in the term $p_f/p_s - 1$ must be complementary to any change in $q - c$, the equalization of $q - c + a$ and r can have no power to determine investment. This must be Sraffa's recognition.

- Excess demand $\Rightarrow$ rise in present price $\Rightarrow$ lower p_f/p_s $\Longleftrightarrow$ rise in the own-rate of interest $\Rightarrow$ increase in production (Sraffa 1932a)—This is Sraffa's production or long-term equilibrium.
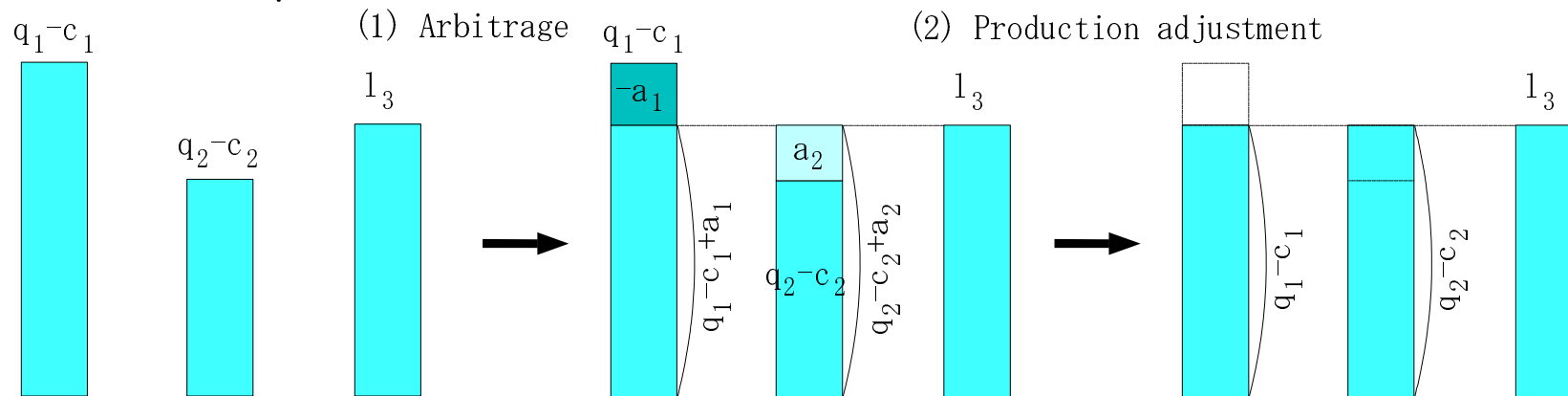
Keynes' Equilibrium

- Keynes' equilibrium is a short-term one, but production and investment can be adjusted. It is not an arbitrage-equilibrium.
- Demand and supply are not adjusted by price changes. Before prices change, investments in assets change.
- The term $q - c$ changes, so that $q - c + a = r$ be restored.
- There is no particular law regarding the direction of change in the term a during the adjustment process; it depends on people's expectation and will be influenced, as Keynes emphasized, by the expectation about production costs.
- Keynes' equilibrium is also different from Sraffa's long-term or production equilibrium. In Keynes' equilibrium the rates of price change are not zero, and the own-rates of interest in terms of assets themselves remain unequal to each other.
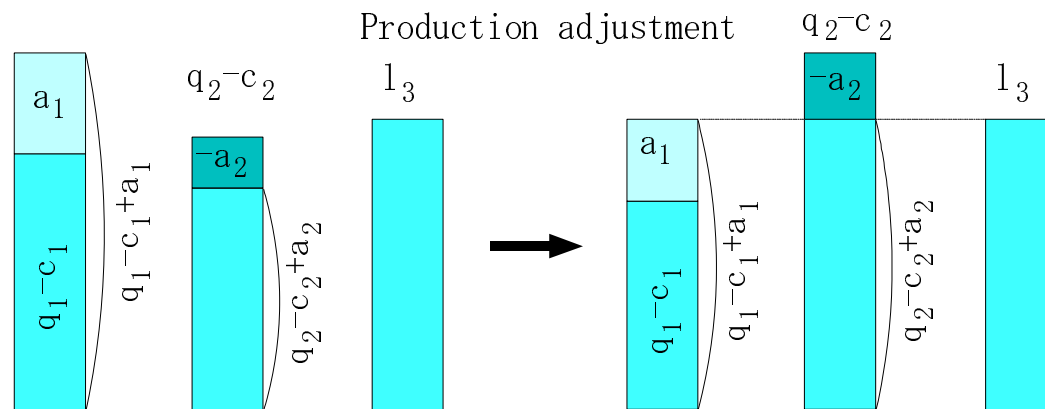
Sraffa's and Keynes' Equilibria

- ## Sraffa's equilibrium

- ## Keynes' equilibrium

Present and Future Prices, Demand and Supply Prices

- For Sraffa, present price=demand price and future price=(normal) supply price; the latter reflects the present production cost.
- Keynes thought that expectation of a rise in future production cost would raise a term (GT, pp.228, 229). That means future price = future supply price which reflects future production cost, and present price = present supply price which reflects present production cost (also see GT, p.141).
- Demand price of an asset, as defined by Keynes, is the present value of the stream of the expected returns to it over its service period discounted by the money-rate of interest (GT, p.137).
- When Keynes says:

    Now those assets of which the normal supply-price is less than the demand-price will be newly produced; and these will be those assets of which the marginal efficiency would be greater (on the basis of their normal supply-price) than the rate of interest (both being measured in the same standard of value whatever it is). (Keynes 1936, p.228),

    'demand-price' should be regarded as the one defined on p.137, not as the demand-price in Sraffa's usage.

Kaldor (1960) (1)

- Kaldor agreed with Keynes that money 'rules the roost', but disagreed on the reason; he attributed it to the fact that money is the standard of value.
- Kaldor interpreted Keynes' theory as treating two-stage equillibriums—arbitrage and long-term—), and thought that 'expected price is tied to the long-run supply price'. (Kaldor 1960, p.69)
- He reached the conclusion that when a-term is positive, which means $p_s < p_f$, the asset can no longer be newly produced. (*idem*, p.70)
- This is Kaldor's interpretation of Keynes' statement 'those assets of which the normal supply-price is less than the demand-price will be newly produced; and these will be those assets of which the marginal efficiency would be greater (on the basis of their normal supply-price) than the rate of interest' (Keynes 1936, p.288)

Kaldor (1960) (2)

- But that is not a correct interpretation, for Keynes added a notice '(both being measured in the same standard of value whatever it is)'.
- Kaldor criticized Keynes' argument that other assets such as gold and land can hold up production if their own-rate of interest is reluctant to fall.
  - Even if the own-rate of interest of gold is reluctant to fall, its own-rates in terms of money will falll when the current price of gold can rise ($p_s > p_f$ or $a < 0$ for gold).
- But this logic can be applied to money, thus Kaldor would have had to say, with Sraffa, that the reluctance to fall of the own-rate of interest of money cannot knock out the production of assets. This is a consequence of his understanding about the function of a as arbitrage.

Barens and Caspari (1997) (1)

- Barens and Caspari also thought that Keynes considered an arbitrage-equilibrium and also identified the present price with the demand price and the future price with the supply price.
- They stated that the own-rate of interest in Keynes' theory played only a passive and irrelevant role; the own-rates of interest follow directly from the system of inter-temporal prices (Barens and Caspari 1997, p.293).
- They further connected the demand and supply prices as defined by them to those as defined by Keynes.
  - Keynes defined the 'demand price' of an asset as the present value of the stream of its retruns over its lifetime discounted with the money-rate of interest, and he defined the 'marginal efficiency of captial' as the discount rate with which the present value of the stream of the returns from the asset is equated to its normal supply price.

Barens and Caspari (1997) (2)

- From this connection they derived a relation, $m = r - a$, i.e. marginal efficienciy is identical to the money-rate of interest minus the rate of appreciation of the price of the asset.

- Thus, not only the own-rate of interest but also the marginal efficiency of captital has become an only passive concept that can be derived from the money-rate of interest and the rate of expected price changes; the marginal efficiency of capital no longer has a power to determine the level of investment nor of employment.

Keynes' Logic is Simple.

- Demand price D is defined as $D = \sum_{t=1}^{T} Q_t/(1+r)^t$ and has no relation to p_s.
- Marginal efficiency is defined as m that meets $S = \sum_{t=1}^{T} Q_t/(1+m)^t$, where S is the supply price. m is also defined as $m = q - c + a$, where $a = p_f/p_s - 1$.
- In equilibrium, $D = S \iff m = r$.

Lawlor (1996, 2006) (1)

- Lawlor emphasized that Keynes' equilibrium is different from Sraffa's equilibrium.
- Here, Sraffa's equilibrium means his long-term equilibrium that appeared in his article in 1932.
- Lawlor referred to Keyne's equilibrium as 'shifting equilibrium', the expression from *GT*, p.293.
- But Lawlor's shifting equilibruim is nothing but Sraffa's arbitrage-equilibrium.
- Lawlor thought that the shifting equilibrium in the stock market has effects on 'flows' of investment, where, Lawlor says, the own-rate of interest of an asset established in the stock market is compared with the marginal efficiency of the newly produced part of the asset.

Lawlor (1996, 2006) (2)

- However, as long as the a-term keeps its movement in arbitrage, the marginal efficiency of a new capital in terms of money also will immediately be equal to the money-rate of interest, which has been equal to all the own-rates of money-interest of all the assets, so the marginal efficiency will lose the power in the flow adjustment.

- Threfore, the marginal efficiency of a new capital must be the one measured by itself, and thus Lawlor's comparison results in the comparison of $q-c$ and r. That means his frow-adjustment is the same one as Sraffa's production adjustment, and its result is nothig but Sraffa's long-term equilibrium.

The Source of Misunderstandings

- The source of their misunderstanding is that they thought Keynes' equilibrium is an arbitrage-equilibrium.
- In this equilibrating process, the a-term moves so that $q - c + a = r$, and thus $q - c$ loses the power to bring the system to equilibrium. The remaining possibility is that production adjustment will occur when $q - c \gtrless r$, which leads to Sraffa's long-term equilibrium.
- Provided this understanding, $q - c + a = r$ becomes meaningless as an equation which determines the level of investment.
- To think $q - c \gtrless r$ causes production adjustment includes to identify present price with demand price, future price with supply price, the latter tied to present production cost.

To Make Keynes' Equation Meaningful

- For $q - c + a = r$ to be a meaningful equation, the a-term must be independent of the equilibrating process, and the independence will be guaranteed by regarding the future price as tied to future production cost and the present price as tied to present production cost, which is also tied to normal supply price.

- A simple understanding that demand price is defined only by expected returns and the money-rate of interest helps us to accept most easily Keynes' statement $D \gtrless S \iff m \gtrless r$.

Why Did Keynes Employed the Concept of the Own-Rate of Interest? (1)

- Keynes did not use the term 'own-rate of interest' in his paper in 1937. 'Rate of interest' is only used for money, and instead 'marginal efficiency' is used for representing advantages for all kinds of assets including money.
- Also descriptions in *GT* are often misleading. Why did he use the concept of own-rate of interest in spite of the danger of causing misunderstanding?
- Sraffa's paper in 1932 illustrated there can be a variety of commodity-rates of interest and presented an equilibrium where they are converged to each other. However, he suggested the equilibrium is not achievable when there are savings and expansion of production. (Sraffa 1932a, p.51; 1932b, p.251)
- In the economy including savings, the long-term equilibrium is not achievable because the demand structure and production costs are changing.

Why Did Keynes Employed the Concept of the Own-Rate of Interest? (2)

- Keynes found there can be an equilibrium with unemployment in a long-term disequilibrium with savings. The equilibrium is brought about by the equalization of advantages of various assets in terms of a common standard of value. In order to represent the advantages of all the assets including money, the concept of own-rate of interest seemed appropriate, and on this ground Keynes could discover the special property of money.

Pasinetti's Interpretation of Keynesian Revolution

- Pasinetti (2007) argued Keynesian revolution should be considered a change from a pure exchange paradigm to a pure production paradigm.

> In the pure production economy, the contributions to production processes and the benefits are regulated according to the quantity of labour (Pasinetti 1981, p.166), where the price of a product changes at the rate of wage change minus the rate of the increase of the labour productivity of the sector producing that product, and the own-rate of interest of the product becomes equal to the money-rate of interest minus the rate of the price change of the product. There can be systems of the own-rates of interest, among which the system with a money-rate of interest that is equal to the rate of wage change would meet the above mentioned principle of the natural economy; such a money-rate of interest can be referred to as 'natural rate of interest' (*idem*., p.194).

- Pasinetti regarded Sraffa as the only pupil of Keynes who pursued theoretical consistency of production economy, but he disregarded chapter 17.

- However, it is chapter 17 that described an equilibrium in the structurally changing production economy.

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