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On the tendency of the market rate of interest to the natural rate in Ricardo's analysis: some critical considerations

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Abstract: This paper aims to be a critical discussion about one of the main accepted results of Ricardo's theory of money and interest, i.e., that the 'natural' rate of interest is determined by the profit rate. It will be argued that some logical inconsistencies seem to affect Ricardo's representation of the tendency of the market rate of interest to the natural rate, with the latter ultimately determined by the rate of profits. According to Ricardo, exogenous changes in the supply of, or demand for, money generate short-run changes of the money-prices ratio and the market interest rate, and permanent changes in the price level play the role of bringing them back to their natural values (the natural rate of interest being taken as a fraction of the natural profit rate). We will try to show that the convergence process envisaged by Ricardo seems to be not free from some critical considerations about its internal coherence if one takes into due account what he conceives to be the specific inducement for the public to borrow a larger quantity of money at a lower interest rate—namely, an above normal difference between profit rate and interest rate - together with the main institutional features of a monetary system.

Keywords: David Ricardo, market and natural rates of interest, classical theory of money, quantity theory of money.

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INTRODUCTION

This paper aims to be a critical discussion about one of the main accepted results of Ricardo's theory of money and interest, i.e., that the rate of interest will tend towards its "natural" level as determined by the rate of profits. Specifically, it will be argued that some logical inconsistencies seem

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to affect Ricardo's representation of this tendency, based on an increase in the price level.

These inconsistencies come to light when one considers that Ricardo appears to set his main arguments about the convergence of the market rate of interest to the natural level in the context of an inconvertible monetary system, in which the concept of a natural, or normal, *ratio* of the quantity of money to prices (determined by the ratio between the given volume of transactions and the given velocity of circulation of money) is consistent with different absolute levels of the quantity of money. Moreover, they come to light when one takes into due account what Ricardo conceives to be the specific inducement for the public to borrow a larger quantity of money at a lower interest rate—namely, an above normal difference between profit rate and interest rate.

The analysis consists of two sections. The first section outlines the general features of Ricardo's theory of money and interest and of the tendency of the market rate of interest to the natural rate based on an increase in the price level. It will be highlighted that Ricardo places this mechanism in a context of a non-convertible monetary system. A literature review of the main interpretations will be carried out.

The second section outlines what, in our view, appear to be the main logical inconsistencies of the convergence mechanism envisaged by Ricardo. We will try to argue how changes in the price level are not in themselves capable of warranting the convergence of the market interest rate to its natural level, taking into account Ricardo's inducement to borrow at the lower-than-normal rate of interest. In order to strengthen our argument, we will discuss Ricardo's convergence mechanism in a convertible monetary system, which appear in itself consistent and not based on the increase in the price level. In the conclusions we will summarize the main results of the paper.

MONEY AND INTEREST IN RICARDO'S ANALYSIS

Monetary theory

As it is well known, Ricardo developed his theory of money during the 'Bullion Controversy', which concerned the causes of the depreciation of the pound sterling and the high inflation occurred in England after the suspension of the convertibility of banknotes into gold on demand by the Bank Restriction Act of 1797.

Ricardo, as a bullionist, argued that the depreciation of the pound sterling

and the high inflation was mainly due to an over-issue of paper money in circulation by the Bank of England under the inconvertible monetary system in force during the Restriction period[1]. Ricardo stressed the negative effects stemming from the suspension of convertibility (Ricardo, [1809] 1951, p. 2; [1810-11] 1951, pp. 74-5; [1816] 1951, p. 52), and the need for such convertibility to be soon restored, which would have prevented the Bank of England from over-issuing banknotes (Ricardo [1821] 1951, p. 356).

Among English classical economists, Ricardo was a strong supporter of the quantity theory of money (cf. Sayers, 1953, p. 33; Humphrey, 1974; de Vivo, 1987, p. 186; Smith, 2017, p. 51). According to Ricardo causation runs unambiguously from the quantity of money to the price level (Ricardo [1811] 1951, p. 193), taken as given the level of aggregate output (volume of transactions), determined by the stage reached by capital accumulation (Ricardo [1821] 1951, pp. 289-96 and p. 390; Garegnani, 1978, p. 338), and the velocity of circulation, which was considered an institutional datum essentially determined by the degree of confidence of the public on credit (Ricardo [1810-11] 1951, pp. 86-90, 276-7, 301).

An interpretation which can be traced back to Marx ([1859] 1904, pp. 239-244), maintains that Ricardo's quantity theory is different under a gold (or silver) convertible monetary system from an inconvertible monetary system in which a *fiat* money circulates (Green 1992, p. 51; Smith, 2017, pp. 51-2). In a gold convertible monetary system, Ricardo essentially confined the quantity theory of money to the short run (Green, 1998, p. 137; Smith, 2013, p. 183; Blaug, 1997, p. 127). The reason for this is that in this system the long-run price level of commodities in terms of gold would be ultimately determined by the technical conditions of production which determine the value of gold, normalized by the official mint price of gold. For a given velocity of circulation, the 'normal', or 'natural', absolute quantity of gold, or of convertible banknotes used as money would be then *endogenously* determined by the given sum of commodity transactions (Ricardo, [1816] 1951, pp. 55-56; [1821] 1951, p. 352; see on this Green, 1982, p. 63; 1992, p. 56).

In order to examine Ricardo's view about the relationship between changes in the money supply and the price level, we can restate this point in a slightly different way. Ricardo seems to identify in the long-run a 'normal', or 'natural', proportion between the quantity of money and the price level, i.e., the natural *real* quantity of money, exclusively determined by the 'effectual demand' for money, that is by the ratio between the volume of transactions and the velocity of circulation (Ricardo, [1810-11] 1951, p. 90;

Green, 1998, p. 137). With a commodity money, or in a convertibility regime, for a given ratio between the volume of transactions and the velocity of circulation the long-run price level is ultimately determined by the relative value of the commodity money, and the price level in turn determines the long-run, or 'normal', quantity of circulating medium (see on this point Ricardo, [1811] 1951, p. 215; [1821] 1951, p. 193).

According to Ricardo, in a situation in which quantities and prices are at their long-run, or normal, levels, an exogenous increase in the quantity of convertible paper money in circulation, for a given volume of transactions and velocity of circulation, only cause a short-run increase in money prices of all commodities other than gold, i.e., a short-run reduction in the relative value of gold, since the money price of gold is fixed at the level established by the mint. This will then make gold effectively cheaper relative to all other commodities, so it becomes 'the cheapest exchangeable commodity' in the country (Ricardo [1810-11] 1951, p. 57). As a result, according to the price–specie flow mechanism, on the balance of payments there would be a larger importation of commodities other than gold which, in turn, would lead to a reduction in gold-convertible banknotes up to the normal quantity, and, thereby, to a reduction in the price level with the return of the relative value of gold to its long-run value. In a convertibility regime, therefore, an increase in the quantity of money above its normal level has for Ricardo only a *temporary* effect on the price level. Consequently, with a commodity money or in a convertibility regime there is in the long run a *unique* price level and a *unique* quantity of circulating medium consistent with the 'natural' proportion.

It is under an inconvertible monetary system that Ricardo argues the increase in prices caused by an additional issue of paper money in circulation must be regarded as a *permanent* phenomenon (Ricardo [1810-11] 1951, p. 91; Green, 1992, p. 149; Smith, 2013, p. 183). The reason lies in the fact that, in a system in which a *fiat* money circulates, the price level is no longer determined on the basis of the theory of value, but, instead, it is simply determined by the quantity of paper money issued by the banking system. Therefore, when a *fiat* money circulates, the long-run real quantity of money determined by the ratio between the volume of transactions and the velocity of circulation, is consistent with several quantities of *fiat* money and several price levels.[2]

Under an inconvertibility regime Ricardo believes that the increase in domestic prices would not trigger the outflow of gold because, differently from what would happen under convertibility, it would not determine a

reduction in the relative value of gold, and it would be accompanied by the fall of the exchange rate (*ivi*, p. 64). When convertibility is suspended, in fact, banknotes cannot be exchanged anytime for gold at the mint, but only on the market (see on this also Boffito, 1973, p. 22). Therefore, against an increase in the quantity of banknotes in circulation, there will not be a temporary reduction in the relative value of gold since for both gold and other commodities there will be a permanent increase in their money prices. Since the monetary authority is no more obliged to sell gold at the mint in exchange for banknotes at a fixed price, the market price of gold will permanently increase, and consequently the relative value of gold will not decrease. Hence, no temptation to export gold arises, i.e., no net outflow of gold from the country occurs. It is in this sense that the increase in the quantity of money in a non-convertible monetary system would be, according to Ricardo, 'over-issued' compared to the 'normal' quantity of currency which would circulate in a convertibility regime. The 'excess' of paper money is in fact defined by Ricardo as "that quantity which adds to our circulation without effecting any corresponding exportation of coin, and which, therefore, degrades the notes below the value of the bullion contained in the coin which they represent." *(ivi*, p. 92).[3] Under an inconvertible monetary system, the 'excess' issue would not be removed from circulation by the export of gold, thus producing a permanent effect on prices. Furthermore, the increase in money prices of commodities will cause the exchange rate to fall without limits, as it is instead the case when banknotes are freely convertible into gold at the mint (Ricardo, *ivi*, p. 72), thus offsetting the incentive to purchase foreign commodities through the purchase of the foreign currency (*ivi*, p. 92).

Rate of interest and rate of profit

Turning now to Ricardo's view on interest rates, he follows Adam Smith in saying that the rate of interest is "ultimately and permanently *governed* by the rate of profit" (Ricardo, [1821] 1951, p. 297, italics added; [1809] 1951, pp. 25-26), and that it cannot be 'regulated' by the interest rate on loans granted by the banking system, nor by the quantity of money issued (Ricardo, [1821] 1951, p. 363). Ricardo maintains that since it "is extremely difficult to determine the rate of the profits of stock [...], the [...] rate of interest will lead us to form some notion of the rate of profits, and the history of the progress of interest affords us that of the progress of profits" (Ricardo, [1821] 1951, p. 296).

The relationship between the rate of interest and the rate of profit in

Ricardo must be placed in the context of the theory of value and distribution of classical economists, according to which the natural, or normal, rate of profits is made up of two parts: the money rate of interest, conceived as the 'pure' remuneration of capital, and the compensation for risk and trouble of employing capital productively i.e., the enterprise profit (Pivetti, 1987, p. 63). These two magnitudes, within the classical analysis of distribution, cannot be determined separately from each other. Given the natural, or normal, rate of profits, functionally determined on the basis of the causally prior determined natural real wage rate and the technique of production employed,[4] either the rate of interest or the enterprise profit should be residually determined. This way of conceiving the relation between the rate of profits, the rate of interest and the enterprise profit suggests to Ricardo, in the wake of Smith, that since in his view the interest rate is governed, ultimately, by the rate of profit, it is the former that represents, in that system of relations, the residual magnitude (Garegnani, 1978, p. 339; Pivetti, 1987, p. 64). It is therefore possible to state that in Ricardo the *level* of the normal rate of profits, net for the compensation of risk and trouble of employing capital productively, determines the *level* of the natural, or *long-run*, rate of interest.

The tendency of the market rate of interest to the natural rate

Ricardo admits, however, that the rate of interest could be *temporarily* influenced by exogenous changes in the supply and demand for money and loans, with the resulting changes in the price level acting as the mechanism which brings the rate of interest back to its natural level (Ricardo, [1810-11] 1951, p. 91; [1821] 1951, pp. 297-8). As we will see, it is the consistency of this mechanism that can be questioned: in our opinion, variations in the price level do not represent the kind of force that, in Ricardo's framework, is in itself capable of warranting the tendency of the market rate of interest to its natural level.

Ricardo's argument, placed in the context of the high inflation occurred during the Restriction Period, is aimed at challenging the idea of those who denied that an over-issue of paper money was the cause of the increase in prices; they insisted that if such an 'excess' of paper money existed, it would show in an abnormally low rate of interest (Ricardo [1809] 1951, pp. 25-6; see also Wicksell, 1935, p. 179). Against this Ricardo claims, according to the quantity theory of money, that the inflationary process was the direct consequence of an increase in the money supply and that the rate of interest could be taken below the level determined by the rate of profit so long as

the excess quantity of money has not led to a corresponding permanent increase in prices (Ricardo [1809] 1951, pp. 13-46; Ricardo [1810-11], [1821] *ibidem*). This is restated in the *Principles*, when Ricardo remarks that "Experience, however, shews, that neither a State nor a Bank ever have had the *unrestricted* power of issuing paper money, without abusing that power […]' (Ricardo [1821] 1951, p. 356, italics added) and where he states that an exogenous increase in the quantity of money "would not *permanently* alter the market rate of interest" but "*only* the value of the money which they thus issued. […]." (Ricardo, *ivi*, p. 364, italics added).

Consistently with his theory of money under a non-convertible monetary system, Ricardo maintains therefore that the quantity of money could be 'in excess', or 'over-issued', and that, if in excess, it would have a permanent effect on the price level of all commodities, including gold. With regard to interest rate changes, Ricardo's argument seems to be grounded on the existence of an automatic market mechanism, i.e., the increase in the price level, working to bring the rate of interest to its natural level for each temporary departure of the former from the latter caused by an increase in the quantity of money. The causal sequence that goes from a greater quantity of money to a higher price level, *via* a lower rate of interest, can be summarized as follows (see on this also De Vivo, 1987, p. 187).

Ricardo maintains, in analogy with the classical economists' analysis of the variations of the market price with respect to the natural price[5] that, starting from a normal situation in which all variables are at their natural levels, when the real quantity of money is greater than its 'effectual demand'– due, for example, to an increase in the quantity of gold brought to the Bank of England in exchange for notes (Ricardo, *ibidem*), or to an higher amount of loans granted by the Bank of England to the State to finance military expenditure (Ricardo [1816] 1951, p. 51; see on this Morgan, 1943, p. 23; Boffito, 1973, p. 9; Blaug, 1997, p. 129) - this will cause the interest rate to decline in relation to the natural level. Ricardo is not explicit on the reasons that could explain the decrease in the rate of interest; he affirms that "[…] if the Bank were to bring a large additional sum of notes into the market, and offer them on loan, […] they would for a time affect the rate of interest" (Ricardo [1810-11], *ibidem*), or, more cautiously, that an increase in the quantity of money due to the "abuses of banking" or "by whatever other cause" would "probably" have an effect on the rate of interest (Ricardo, [1821],pp. 297-8).[6] However, Ricardo's intention seems not to provide a full explanation for the underlying causes of the fall in the rate of interest from its natural level, but to carry out an abstract exercise

to underline what would happen to the interest rate and to prices if, for whatever cause, the quantity of money in circulation would increase.

The decrease of the rate of interest from its natural level, and the corresponding increase in the enterprise profit in relation to its normal level, activates a sort of 'transmission mechanism' (see Smith, 2013; 2017 and the next section) by which the banking system is able to put a greater quantity of money in circulation, providing an incentive for producers to increase their borrowings in order to ask for labor and capital goods with the aim to expand production and to obtain higher profits (Ricardo [1821] 1951, p. 364). This attempt, however, collides with an unchanged level of activity, since the latter in Ricardo, and more generally in the classical economists, is determined according to the stage reached by capital accumulation. As a result, the increase in spending generates a *permanent* increase in the price level of *all* commodities which enables the economic system as a whole to absorb the increased amount of money, to re-establish the initial level of the real quantity of money and to bring the rate of interest to its natural, or long-run, level determined by the rate of profit:

> "Reduction or Increase of the Quantity of Money always *ultimately* raises or lowers the Price of Commodities; when this is effected, the Rate of Interest will be precisely the same as before; it is only during the Interval, that is, *before* the Prices are settled at the new Rate, that the Rate of Interest is either raised or lowered." (Ricardo [1819] 1951, p. 445, italics added)

However, Ricardo does not explain what kind of forces the increase in the price level is able to engender in order to bring the interest rate back to its natural level. Ricardo simply seems to take for granted that variations of the market rate of interest below the natural level should be treated as merely temporary[7] thanks to the levelling action of the price level.

A review of some interpretations

In addressing the issue concerning the tendency of the market rate of interest rate to the natural rate in Ricardo's analysis, it is worthwhile to dwell on the interpretations on the subject provided by the literature.

Among neoclassical interpreters, Wicksell (1935, p. 179) has claimed that Ricardo does not need to continue to expect the banking system to keep the interest rate below the normal level, to the extent that the increase in prices allows the absorption of the excess quantity of money in circulation. Wicksell seems therefore to take for granted, as Ricardo does, that the rise in prices succeeds in bringing the interest rate back to its natural level and

not simply to absorb the greater quantity of money in circulation. The same acknowledgement seems to be made by Wicksell regarding the convergence process of the market rate of interest to the natural level he conceived, but with some differences. Wicksell, in fact, claims that for any deviation of the market rate of interest from the natural rate, and for an investment demand function elastic with respect to the rate of interest, a cumulative process of inflation or deflation would be set in motion - due to an excess/deficiency of investment expenditure over the supply of savings corresponding to a full employment level of income - which would continue indefinitely until the banking system brings the rate of interest to the natural rate (Wicksell, ivi, pp. 194-201; see on this Garegnani, 1979, pp. 65-7).

Wicksell, therefore, differently from Ricardo, does not conceive price variations as an *automatic* force ensuring the return of the market rate of interest to its natural level insofar as it attributes to the banking system the role of adjusting the former to the latter. He, however, takes for granted that the rise/decrease in prices induces the banking system to bring the rate of interest to the natural rate in order to avoid continued inflation/deflation, without providing a full explanation of the underlying forces that should push the banking system to do so. Wicksell describes, in the case of an inflationary process, what would happen if the banking system would *not* accommodate the rate of interest to its natural level, thus stopping the continuous increase in prices; there will be, Wicksell maintains, an "untenable shifting of the balance of payments […] through the medium of price changes" (Wicksell, ivi, p. 201) or, when gold constitutes part of circulation, the increase in the price level of commodities other than gold would cause an increase in the gold withdrawal from the banks because of "cash requirements of business for smaller payments" (ibid.), which could mine the convertibility regime.

There are, however, further differences between Ricardo and Wicksell. First, in Ricardo and in classical theory is completely missing the neoclassical idea of an investment demand function elastic with respect to the rate of interest and of competition establishing, through factor price adjustment, a full-employment level of output at long-run equilibrium (Garegnani, 1978, p. 339; Smith, 2013, p. 194, fn 4). Ricardo did not pose the question of a possible divergence between decisions to save and decisions to invest as he simply identified the two magnitudes (Garegnani, ivi, p. 340). What we find in Ricardo is that, for a given level of aggregate output determined by capital accumulation, the decrease in the rate of interest would induce an increase in aggregate expenditure, although not defined and formalized in

general terms, justified by the increased profit of enterprise, with a subsequent increase in prices.

Moreover, as we have seen in the previous paragraph, Ricardo seems to maintain that the real quantity of money may temporarily diverge from the level determined by its 'effectual demand', i.e. by the ratio between the volume of transactions and the velocity of circulation, as a result of an *exogenous* increase in the money supply; this, according to Ricardo, will temporarily lower the market rate of interest below the natural level, thus providing the incentive to increase the demand for money and loans and thereby enabling the greater quantity of money to be put in circulation.

Wicksell, on the other hand, does not ascribe the temporary reductions of the rate of interest to exogenous changes in the money supply, as he assumes that the banking system is always able to provide any amount of money and credit on demand *without* changing the rate of interest (Wicksell, 1935, p. 194; see on this Garegnani, 1979, p. 65). Therefore, according to Wicksell the temporary difference between the natural and the market rate of interest results, in most cases, from an increase in the former due to changes in the conditions of production and distribution (Chiodi, 1991, p. 21).[8]

Wicksell has also argued that in Ricardo is completely missing an explanation of the mechanism by which variations in the rate of interest lead to an increase in the price level (Wicksell, *ivi*, p. 181). Wicksell's argument is part of his broader discussion about what Ricardo claims (Ricardo [1810-11] 1951, p. 92) in order to exclude that the rate of interest can be *permanently* lower than the level determined by the profit rate. Ricardo argues that if the banking system would lend a greater quantity of money at an interest rate far below the natural level, the rate of profit would be reduced in 'the same proportion' (Ricardo, *ibid.*); for the effects of these abnormally low profits, Ricardo continues, no other economic system could enter in competition with the one considered, unless it equally reduces its rate of interest. The permanent fall in the rate of interest would lead, therefore, according to Ricardo, to the 'absurd' conclusion that the rate of profit would be determined by the rate of interest (Ricardo, *ibid.*). Ricardo does not explain how the alleged fall in profits could occur. Wicksell (see also Chiodi, ivi, p. 11) maintains that Ricardo seems to hold that the fall in the rate of profits would ultimately be caused by the *decrease* in production costs and prices generated by the sharp fall in the rate of interest (Wicksell, *ibid.*). However, Wicksell's interpretation does not seem convincing, insofar as the fall in production costs and prices does not in itself lead to a

corresponding fall in profits; the latter could occur if prices fell proportionately *more* than the costs of production (e.g., money wages). Moreover, is it absent in Ricardo any idea, as it would later be developed by Tooke (1844; see Smith, 2011; 2017) that the money rate of interest constitutes a component of the normal costs of production of commodities, so that permanent changes in that rate exert a positive causal influence on the price level. Therefore, Ricardo's *reductio ad absurdum* seems to lie precisely in imagining a situation that, for him, is absolutely implausible, as he considers unconceivable a complete reversal of the relationship linking the rate of interest to the rate of profits, ultimately because the dependence of the rate of profit on the real wage rate would be undermined[9].

In any case, Ricardo's argument, as Wicksell observed (*ivi*, pp. 179-81), is in complete conflict with the whole conception of his theory of money and prices, according to which the fall in the rate of interest, due to an increase in the quantity of money in circulation, leads to an *increase*, and not to a decrease, in the price level, thus bringing the rate of interest to its natural level. Ricardo *assumes* and *takes for granted* that the rate of interest cannot permanently deviate from the 'anchor' represented by the rate of profit - hence his *reductio ad absurdum* - without providing any explanation of what automatic forces the rise in prices is able to generate in order to bring the rate of interest back to its natural level.

More recently, some neoclassical authors have interpreted Ricardo's convergence process of the rate of interest to its natural level as grounded on functional relations between the rate of interest and the demand for money and between the rate of interest and aggregate demand. For example, this is the view held by Ahiakpor (1999, p. 443), who argues that in Ricardo the increased money supply generates a 'liquidity effect' that reduces the interest rate below the natural level – deemed equal to the rate of return on capital employed in production and ultimately determined by the real forces of supply and demand for capital (ivi, p. 441; cf. on this Blaug 1997 pp. 156-8; Diatkine, 2013, p. 125). The subsequent increase in prices, due to the increased aggregate expenditure caused by the lower rate of interest, leads to an additional request for money or credit which brings the interest rate back to its natural level. The term 'liquidity effect' seems to be meant by Ahiakpor as the transmission mechanism according to which a reduction in the rate of interest induces the desire to change the composition of the given stock of wealth by holding the greater quantity of money at the expense of bonds and securities (cf. on this Edmond and Weill, 2008, p. 148). This mechanism would then allow the system to absorb the greater quantity of

money issued and the following increase in the price level would provide the *excess* demand for money which enables the rate of interest to converge to its natural level.[10]

While not explicitly mentioning the 'liquidity effect' or analogous transmission mechanisms, Blaug (1997, p. 158) seems to hold a similar position, in that he claims that Ricardo and, more generally, the classical economists, rely on an inverse relationship between the demand for money and the rate of interest. However, no functional relation linking the demand for money to the rate of interest seems to be found in Ricardo (see on this point Viner [1937] 2017, pp. 150-1; King, 2013, p. 124, Takenaga, 2013, p. 80). It would be also inconsistent with Ricardo's idea that in the aggregate there cannot be overproduction of commodities, hence no possibility of accumulation of money (hoarding) following a disruption of the normal monetary circuit of cash receipts and payments (Green, 1992, p. 87).[11] On the other hand, Ricardo's 'applications to the Bank for money' (Ricardo, [1821] 1951, p. 364), as we shall see, do not appear to be viewed as a demand for money to be held as such in so far as such loan applications, following the decrease in the rate of interest, are only intended to employ productively the money issued in the hope of every producer to increase profits because of an above-than-normal profit of enterprise.

In this regard, within the revival of the classical surplus approach, Smith (2013, p. 186; 2017, p. 55) has claimed that the 'sensitivity' of aggregate expenditure to variations in the rate of interest with respect to the rate of profits cannot be viewed as a solid transmission mechanism by which Ricardo can suppose that an exogenous increase in the quantity of money is put in circulation and subsequently absorbed by the system via an increase in the price level. According to Smith (2013, ibid.), Ricardo gave no serious consideration as to how, given the profit rate, a decrease (or increase) in the rate of interest would precisely induce an increase (reduction) in the demand for credit to finance an increase (reduction) in monetary expenditure. Ricardo simply took for granted such a causal relationship. This was also the criticism raised by Tooke and the banking school in the 1840s to the classical's proposed quantity theory of money (Tooke, 1840; 1844; see on this Smith, 2017, ivi, p. 53). Tooke denied that 'the mere facility of raising money at a low interest forms a sufficient motive for persons […] to borrow for the purpose of purchasing commodities with a view to resale' (Tooke, 1840, p. 155), thus rejecting any predictable and systematic influence of the rate of interest on the inducement to spend as 'the limit to the motive for the exercise of the power [to purchase

commodities] is in the prospect of resale with a profit' (Tooke, 1844, p. 79).

Lastly and in the same vein, Caminati (1981) has claimed that in Ricardo and, more generally, in classical economists, the "stress on transactions motive demand for money was insufficient to justify the widely accepted view that a change in the money supply had only a temporary effect on the rate of interest, while exerting a permanent effect on the price level" (ivi, p. 80). Caminati suggests that, as long as Ricardo conceived money as demanded solely for transactions motive, the increase in prices as a result of an increase in the money supply is sufficient to absorb the greater quantity of money in circulation only and not to ensure the adjustment of the market rate of interest to the natural rate. Our discussion will follow this suggestion.

A CRITICISM OF RICARDO'S RISING PRICES-BASED CONVERGENCE MECHANISM

In our view the discussion of Ricardo's convergence mechanism of the market rate of interest to the natural rate cannot be detached from an analysis of the nature of the alleged incentive for producers to increase their demand for loans postulated by Ricardo. As we shall see, even taking into due account the specific inducement to borrow a greater quantity money at a lower interest rate, Ricardo does not seem to give adequate consideration as to how the rise in prices would precisely induce the return of the rate of interest to the level determined by the profit rate.

Our point is that the increase in prices occurring after the exogenous increase in the quantity of money is not capable to push the market rate of interest up to the natural rate, despite the real quantity of money returns to its 'natural' level in accordance with Ricardo's theory of money in a non-convertible monetary system.[12] The increase in prices might just increase the demand for money to the extent needed to meet the increased supply, which would otherwise be exceeding, and a new 'equilibrium' would be then established between demand for and supply of money at the lower-than-natural interest rate initially occasioned by bank behavior. Therefore, it cannot be agreed, in our opinion, Ricardo's statement that "as soon as the additional sum of notes or of money became absorbed into the general circulation, the *rate of interest would be as high* [...]" as before (Ricardo, [1821]1951, pp. 297-8, italics added). In our view, in order for the convergence process described by Ricardo to be consistent, the increase in prices should cause an increase in the demand for money *beyond* that needed to meet the increased supply, therefore greater than the one which reestablishes the natural money-price ratio. It is under this condition, we

believe, that the rise in the price level would be capable to represent that kind of force that would allow, in Ricardo's framework, the market rate of interest to converge towards its natural level.

The 'applications to the Bank for money'

With the aim to better develop our argument, we have now to turn our attention to the mechanism - the 'applications to the Bank for money' (Ricardo, [1821] 1951, p. 364) which we mentioned in the previous section - by which Ricardo maintains that a decrease in the rate of interest induces an increase in the demand for loans. This will help us to highlight how, in our view, the increase in prices does not seem sufficient, in Ricardo's framework, to bring the market rate of interest to its natural level.

Ricardo maintains that those who intend to borrow money do so in view of the profits they expect to obtain from the use of capital:

> "The interest which a man agrees to pay for the use of a sum of money is in reality a portion of the profits which he expects to derive from the employment of a capital which that sum of money will enable him to obtain. In the interest which he is willing to pay he is guided solely by the probable extent of those profits." (Ricardo [1811] 1951, p. 374)

The 'applications to the bank for money' depend, according to Ricardo, on the difference between the rate of interest and the rate of profit obtainable from the productive use of money, hence on the level of the enterprise profit. A decrease in the rate of interest caused by an increase in the quantity of money induces a demand for loans greater than normal – i.e., greater than the request of loans which enables the commodities produced to circulate at their natural prices and to obtain normal profits on capital employed – which stimulates producers as a whole to increase their activity because of an above-than-normal profit of enterprise:

> "The *applications to the Bank for money*, then, depend on the comparison between the rate of profits that may be made by the employment of it, and the rate at which they are willing to lend it. If they charge less than the market rate of interest, there is no amount of money which they might not lend,—if they charge more than that rate, none but spendthrifts and prodigals would be found to borrow of them." (Ricardo, [1821] 1951, p. 364, italics added, already quoted)[13]

However, Ricardo considers unfeasible any aggregate increase in production levels in response to an increased amount of money in circulation,

while some producers will manage to steal 'market shares', expanding their production at the expense of some competitor. In this regard Ricardo affirms:

> "When anyone borrows money for the purpose of entering into trade, he borrows it as a medium by which he can possess himself of "materials, provisions, &c." to carry on that trade; and it can be of little consequence to him, provided he obtain the quantity of materials, &c. necessary, whether he be obliged to borrow a thousand, or ten thousand pieces of money. If he borrow ten thousand, the produce of his manufacture will be ten times the nominal value of what it would have been, had one thousand been sufficient for the same purpose. The capital actually employed in the country is necessarily limited to the amount of the "materials, provisions, &c." and might be made equally productive, though not with equal facility, if trade were carried on wholly by barter. The successive possessors of the circulating medium have the command over this capital: but however abundant may be the quantity of money or of bank-notes; though it may increase the nominal prices of commodities; though it may distribute the productive capital in different proportions; though the Bank, by increasing the quantity of their notes, *may enable A to carry on part of the business formerly engrossed by B and C, nothing will be added to the real revenue and wealth of the country. B and C may be injured, and A and the Bank may be gainers, but they will gain exactly what B and C lose.* There will be a violent and an unjust transfer of property, but no benefit whatever will be gained by the community." (Ricardo, [1810-11] 1951, p. 93, italics added)[14]

It follows that if these are the general effects stemming from an increased money supply, only the rise in prices can absorb the higher quantity of money in circulation. Since the overall volume of transactions has not increased, the increase in prices enables the monetary value of production to grow sufficiently to accommodate the greater money stock. Price increases do not seem therefore able to generate a competitive mechanism capable of bringing back the rate of interest to the natural level, but only to absorb the greater quantity of money in circulation.[15] If, hypothetically, prices should not increase, the greater quantity of money would eventually be returned to the banking system, as it would be superfluous in relation to an unchanged aggregate volume of transactions.

Ricardo's 'applications' appear in any case to be based on the assumption

that if the banking system is willing to provide more purchasing power, the desire for accumulation will be artificially fueled by a lower rate of interest – i.e., by an above-than- normal enterprise profit – with spending decisions correspondingly increased. This phenomenon may occur continuously only within an institutional framework, such as the one characterized by the non-convertibility of currency, in which "the previously existing checks against an over-issue [have] been thereby removed" (see above, first section), and in which, according to Ricardo, the banking system is provided with the power to boost the monetary expenditure and, ultimately, to permanently raise money prices. Hence, according to Ricardo's assertions, these 'applications' can be interpreted just as the working of the 'transactions motive' that underpins the demand for money.

We can further assume that, in accordance with Ricardo's conception of the demand for money as being determined solely by the value of transactions (as discussed in the first section), for a given level of production and a constant velocity of money circulation the quantity of money held by each individual always stands in a specific and fixed 'proportion' to the volume of transactions. This ratio would not be altered by fluctuations in the quantity of money and/or by temporary variations of the rate of interest from its natural level, since, according to Ricardo, individuals have no motives to ask for money other than those related to transactional needs. Therefore, an increase in the money supply that results in enterprise profits exceeding the 'normal' level encourages each producer to increase his borrowings, generating in every individual the 'optical illusion' of being able to expand his own business. This outcome cannot, of course, be achieved by every producer, which means that the increased aggregate monetary expenditure will lead only to a rise in the price level absorbing the greater quantity of money in circulation.

A short answer to potential objections

Our argument could, however, give rise to a doubt in the reader: if, after the increase in prices, the interest rate remains at the lower level - and thus the enterprise profit remains higher than normal – would not this generate further requests for loans to push up the interest rate *after* the increase in prices? In other words, would not the persistently higher enterprise profit induce a further demand for loans which would eventually generate an *excess* demand for loans able to bring back the interest rate to its natural level?[16] Although this argument may apparently help to solve the problem we just raised, it shows some weaknesses which we will now put forward.

First, when Ricardo speaks about the magnitude capable of bringing the rate of interest back to the natural level, he refers exclusively to the price level. As far as we know, there are no references made by Ricardo to additional circumstances, such as a possible excess demand for loans generated by the reduction in the interest rate. However, even if it were to be admitted that it is an excess demand for loans which pushes the interest rate up, nothing would prevent, in principle, that this upward pressure would operate immediately – assuming, so to speak, an infinite elasticity of the demand for loans to the interest rate – with the interest rate rapidly returning to the natural level.

It could alternatively be assumed that the excess demand for loans does not manifest itself, so to speak, entirely at once, but takes the form of several successive steps until the enterprise profit remains at the above-normal level, thus leading to a gradual increase in the interest rate towards its natural level. Such adjustment would in any event seem to conflict with Ricardo's claim that it is the price level which allows the interest rate to return to its natural level. Although this hypothesis cannot be ruled out, it does not appear more convincing than the previous one, given the arbitrary character of both.

The tendency of the market rate of interest to the natural rate in a convertibility regime

The temporary nature of interest rate changes following a monetary expansion appears to find a consistent explanation in a context of a convertibility regime, where Ricardo seems to refer to a convergence process of the market rate of interest to the natural rate based on the outflow of gold from the national borders, rather than to changes in the price level:

> "If the Bank had doubled its circulation, it still would have no *permanent effect upon the value of money*. If such a thing had taken place, the general level of interest would be restored in less than six months. The country only required, and could only bear, a certain circulation; and when that amount of circulation was afloat, *the rate of interest would find its wholesome and natural level*" (Ricardo, [1822] 1951, pp. 222-3, italics added)

Although Ricardo does not clarify how the adjustment process takes place, he seems to associate a 'floating' currency circulation with an automatic mechanism bringing the rate of interest to its natural level, in a context in which the economic system could 'bear' only a 'certain

circulation' and in which an increase in the quantity of money would have 'no permanent effect' on prices. These references suggest that Ricardo is referring to a convertibility regime (cf. on this Petri, 1983, p. 18).

We may assume that Ricardo's reasoning develops as follows. After the initial increase in the quantity of convertible money above its normal level and following the temporary fall in the relative value of gold (e.g., the rise in the money prices of all commodities except gold), the gold flowing out of national borders will reduce the additional quantity of convertible money, with the latter previously introduced into circulation by means of a decrease in the rate of interest with respect to its natural level. Since the gold outflow is the counterpart of the purchase of foreign commodities which have become more competitive, this would not allow the domestic producers to sell the quantities produced at the new higher prices. Thus, a shortage of liquidity occurs, and producers increase their demand for loans as long as the domestic sales volume does allow them to make payments set by contract (e.g., money wages). The banking system, however, would not be willing to provide an additional quantity of money at a lower interest rate since gold reserves required to warrant the convertibility of banknotes would further diminish. Hence, competition between manufacturers will raise the interest rate back to its natural level. We may notice that the increase in the rate of interest cannot eliminate the 'excess' demand for loans: only a decrease in the general price level, caused by an aggregate supply of commodities in excess with respect to the monetary expenditure, would allow the reduction in the demand for loans, thereby enabling the new lower quantity of money in circulation to be absorbed by the economic system.

If our reconstruction is correct, the process to which Ricardo seems to refer can help to understand how the fall in the rate of interest from its natural level caused by an increase in the quantity of money in circulation can be considered having a *temporary* nature *only* if that same greater quantity can be 'expelled' from the system.

This way of proceeding seems in line with the classical analysis of the tendency of the actual, or market, prices towards natural prices, according to which when the quantity supplied of a commodity exceeds the 'effectual demand', the market price falls short the natural price and, as a result of competition, capital flows out of the industry in search of more profitable employments, thus adjusting the quantity produced to its effectual demand as well as the market price to the natural price (Smith, [1776] 1976, pp. 73-4).

Broadly speaking, according to Ricardo the temporary nexus between money and interest concerns the quantity of circulating medium. Under a convertibility regime, as previously discussed, that quantity cannot diverge for long from its normal level, with the latter ultimately determined, together with normal prices, by the relative value of gold. Therefore, as Ricardo seems to suggest, the same forces capable of driving the quantity of money back to the normal level should 'jointly' drive the market rate of interest to its natural level, with the former which had fallen below the latter precisely because of the increased quantity of money.

In a non-convertibility regime, although for Ricardo the temporary nexus between money and interest still occurs, no force is involved in bringing the 'excess' quantity of circulating medium back to its normal level, as long as in this monetary system what can be identified is only a normal *real* quantity of money determined by the given volume of transactions and velocity of circulation, consistent with infinite quantities of circulating medium and infinite price levels. Therefore, if the quantity of money is 'forced' to remain in circulation (Ricardo [1810-11] 1951, pp. 91-2; [1811] 1951, p. 377), without the possibility of being 'ejected', and having that quantity determined the reduction of the rate of interest, there appears to be no reason for the latter to be brought back to its natural level once the quantity of money has been absorbed by the increase in the price level.

The case of an increase in the demand for loans

In the case of an exogenous increase in the demand for loans, Ricardo seems instead to assume that it is with the removal of the causes that engendered the excess demand for loans that the rate of interest can be brought back to its natural level, in a manner somewhat mirroring what Ricardo seems to conceive with regard to the excess supply of money in a convertibility regime as discussed in the previous paragraph:

> "When the market prices of goods fall from an abundant supply, from a diminished demand, or from a rise in the value of money, a manufacturer naturally accumulates an unusual quantity of finished goods, being unwilling to sell them at very depressed prices. To meet his ordinary payments, for which he used to depend on the sale of his goods, *he now endeavours to borrow on credit, and is often obliged to give an increased rate of interest*. This, however, is but of temporary duration; for either the manufacturer's expectations were well grounded, and the market price of his commodities rises, or he discovers that there is a permanently diminished demand, and he no longer resists the

course of affairs: prices fall, and money and interest regain their real value." (Ricardo, [1821] 1951, pp. 297-8, italics added)

Here Ricardo, despite his adherence to Say's Law, seems surprisingly to extend the possibility of overproduction to the economic system as whole. Ricardo seems to argue that when faced with a general *temporary* aggregate glut of commodities, firms prefer not to sell all the quantity produced 'at very depressed prices', but rather to remain with a certain quantity of inventories so as to mitigate the fall in prices. As a consequence of the temporary decrease in prices, producers will increase their demand for loans because of a decreased flow of cash revenues compared with contract payments (e.g., money wages), which, for a given money supply, will generate an increase in the interest rate above its normal level. The same effect on prices would occur, according to Ricardo, as a result of any other temporary cause - which he seems to summarize in the expression 'rise in the value of money' in order to rule out any *lasting*, or permanent, cause of variations in prices such as changes in the conditions of production of commodities[17] - leading to a decrease in money prices. The return of sales to normal levels, with the consequent increase in prices, would allow the normal flow of payments to resume along with the return of the demand for loans and the interest rate to their corresponding normal levels. On the other hand, if prices stabilize at a lower level due to a permanently diminished demand, a general decline in the monetary value of transactions will be observed, along with a decrease in money wages: this situation will lead to a lasting reduction in the demand for money and loans, ultimately bringing the interest rate down to its natural level. Therefore, according to Ricardo it is precisely the elimination of the excess demand for loans caused by the initial general glut that allows the market rate of interest to return to its natural level.

CONCLUSIONS

The aim of this paper is to highlight some critical points of Ricardo's theory of interest which, in our opinion, may lead to formulate some doubts about the internal consistency of the convergence process envisaged by Ricardo of the market rate of interest to the natural level based on an increase in the price level.

We have tried to argue that the adjustment mechanism postulated by Ricardo is not entirely convincing from a logical point of view.

Ricardo seems to take for granted that the increase in the price level ensures the tendency of the market rate of interest to its natural level, but

in our opinion this mechanism is barely sufficient to ensure the absorption of the greater quantity of money put in circulation, and not to allow the market rate of interest to converge to its normal level, with the latter ultimately determined by the rate of profits. This conclusion is emphasized considering that, in the case of a convertibility regime, Ricardo seems to hint at another and apparently more consistent mechanism to support the convergence of the market interest rate based on the outflow of the excess quantity of money and not on the increase in prices, and which appears more in line with the analysis of classical economists of the tendency of the market price to the natural price.

Moreover, taking into account Ricardo's alleged incentive for producers to increase their demand for loans– represented by an above normal difference between the rate of interest and the rate of profit and representing the 'working' of the demand for money for transactional purposes – it seems possible to state that the function of the increase in the price level can *only* be that to allow the absorption of the increased quantity of money put in circulation. Therefore, the rise in prices does not appear to represent the kind of process that in Ricardo should allow the rate of profit to be the dominant, systematic and persistent force to which the natural rate of interest should be 'anchored'.

The increase in the price level is, however, in Ricardo's view, the mechanism by which, in a non-convertibility regime, the real quantity of money is brought back to its natural level determined by the effectual demand. Ricardo, therefore, seems probably spontaneously inclined to think that, thanks to the rise in prices, even the rate of interest should return to its natural level determined by the rate of profits, without bothering to analytically justify this mechanism.

Furthermore, Ricardo's analysis of the tendency of the rate of interest to its natural level is of course part of a broader argument focused on what in his view are the negative effects stemming from the suspension of convertibility following the Bank Restriction Act of 1797 and on the need for such convertibility to be soon restored. The debate joined by Ricardo did not therefore seem to have academic purposes, but rather the 'political' objective of curbing the banking system's power to create and issue money.[18]

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Notes

1 Currency depreciation and inflation was measured by the difference between the market and the old mint price of gold in terms of paper money as price indices were not used (see Humphrey, ivi, p.7).

2 Although it cannot be discussed here, we mention the different position held by Marcuzzo and Rosselli, who claim that Ricardo did not conceive the 'natural' absolute quantity of money as a quantity determined on the basis of the relative value of gold, but as the one at which the market and the mint price of gold were equal (Marcuzzo and Rosselli, 1991, pp. 48-57; 2015, pp. 371-2). This argument is grounded on some passages where, in the two authors' interpretation, Ricardo would refer to a relative instability in the demand for money due to changes in the volume of transactions and in the velocity of circulation (Ricardo [1811] 1951, pp. 247-8) as well as to a non-constant value of gold in terms of commodities (Ricardo [1823] 1951, pp. 400-1). A similar view is also in Deleplace (2007).

3 "Parliament, by restricting the Bank from paying in specie, have enabled the conductors of that concern to increase or decrease at pleasure the quantity and amount of their notes; and the previously existing checks against an over-issue having been thereby removed, those conductors have acquired the power of increasing or decreasing the value of the paper currency." (Ricardo, [1810-11] 1951, p. 75, italics added)

4 The foundations of this theory, further articulated in the Principles, were laid by Ricardo in the 1815's Essay on profits (see Sraffa, 1951, I, xxxiii). Before this period, in his 1809-11 writings on money Ricardo subscribed to the vague notion of Smithian origin that the rate of profits is determined by 'competition of capitals not consisting of circulating medium' (Ricardo [1810-11] 1951, p. 92; see De Vivo, 1987, pp. 189-191)

5 "Do you think there is anything in the nature of money, or of the transactions regarding the borrowing or lending of money, which distinguishes it from other commodities which find their value in the market, according to the proportion of demand and supply? None, whatever; the market rate of interest for money depends on the proportion between the borrower and the lender of capital, without reference to the quantity or value of the currency by which the transactions of the country are carried on." (Ricardo, [1818] 1951, p. 346, italics added)

6 Ricardo's reference to the'abuses' of the banking system could be traced back to the overall expansion of banknotes by note-issuing country banks facilitated, according to Ricardo ([1810-11] 1951, p. 88), by the monetary expansion of the Bank of England during the Restriction Period (see also Smith, 2013, p. 184; Arnon, 2011, p. 73; de Boyer des Roches and Solis Rosales,

2016, p. 168; Laidler, 1987, p. 289). It could then be assumed that, as a result of the monetary expansion, the banking system as a whole is allowed to have more funds at its disposal to grant a higher amount of loans that generate a downward pressure on the interest rate due to competition among the banking system.

7 Ricardo seems to be quite clear and explicit on this point, although in a letter to Malthus of 1817 he claims: "Although interest is undoubtedly ultimately regulated by profits, rising when they are high, and falling when they are low, yet there are considerable intervals during which a low rate of interest is compatible with a high rate of profit, and this generally occurs when capital is moving from the employments of war to those of peace." (Ricardo, [1817]1951, p. 199).

8 It does not therefore seem to be agreeable the position expressed by Marget (1966, p. 98), according to which the Wicksellian doctrine "with respect to the relation between money and the rate of interest was identical with the heart of Ricardian doctrine on the subject".

9 As Ricardo famously stated, "profits would be high or low in proportion as wages were low or high" (Ricardo [1821] 1951, p. 111)

10 It is worth noting that Ahiakpor (1985, pp. 20-23) claims that in Ricardo it is with the increase in the price level that the greater money supply is absorbed by the economic system, thus not referring to any alleged liquidity effect operating, so to speak, before the effect on the price level. Nevertheless, he maintains that "the increased demand for credit, when the prices of investment goods rise, pushes the market rate of interest up again." (ivi, p. 23).

11 As pointed out by Garegnani (1979, p. 74), these interpretations of the relation between the rate of interest and the demand for money are peculiar to those contributions following the publication of Keynes' General Theory and aimed at a rehabilitation of the neoclassical theory.

12 Ricardo states that "It is only during the interval of the issues of the Bank, and their effect on prices, that we should be sensible of an abundance of money" (Ricardo, [1810-11]1951, ibidem, italics added).

13 Thornton seemed to have a similar view: 'In order to ascertain how far the desire of obtaining loans at bank may be expected at any time to be carried, we must enquire into the subject of the quantum of profit likely to be derived from borrowing there under the existing circumstances. This is to be judged of by considering two points: the amount, first of interest to be paid on the sum borrowed; and secondly of the mercantile or other gain to be obtained by the employment of the borrowed capital' (Thornton [1802] 1939, pp. 253-4)

14 The passage just quoted refers to the impossibility of an increase in the aggregate volume of production in response to an additional issue of money and credit. Ricardo seems quite clear in maintaining that those who borrow money intend to enter into trade and, therefore, to dispose of the 'capital' to start production. The economy disposes however of an amount of 'capital'

limited by the stage reached by accumulation; therefore, although a generic producer 'A' may be able to expand its production activities thanks to the higher amount of money, this could only happen at the expense of the generic producer 'B', without any possibility for the aggregate production volume to increase.

15 The increase in prices following an increase in the quantity of money is simply the outcome of assuming both the velocity of circulation and the volume of transactions to be fixed, with the latter reflecting the stage reached by capital accumulation. Indeed, for Ricardo the quantity theory of money was ultimately the consequence of assuming Say's Law (Green, 1992, p. 16) although, as we shall see later, Ricardo seems occasionally to depart from Say's Law in that sometimes he appears to hint, however quite incidentally, at possible situations of overproduction. However, even allowing the volume of transactions, rather than the price level, to rise in response to an increase in the money supply, for a given velocity of circulation the monetary value of output would rise as well, thus again enabling the economic system to absorb the greater quantity of money but not to generate a market mechanism capable of bringing the rate of interest back to the natural level.

16 This seems to be view held by Panico (1988, p. 17), who claims that the increase in the price level following the increased demand for loans for a lower than natural interest rate will go on until the market rate adjusts to the average rate. Panico seems to maintain that if the interest rate is below its natural level, the continued demand for loans will lead to an increase in the amount of money in circulation, with the associated increase in prices.

17 The above quoted passage should be read together with what Ricardo states a few lines earlier, where he seems to emphasize the temporary nature of the causes which determine the fall in prices: "With every fluctuation in the quantity and value of money, the prices of commodities naturally vary. They vary also, as we have already shewn, from the alteration in the proportion of supply to demand, although there should not be either greater facility or difficulty of production". (Ricardo, ivi, p. 297, italics added)

18 As claimed by Rieter (1998, p. 246, italics added), "The debate was not – at least not primarily – an academic discussion; at stake were real and substantial political interests, not theoretical niceties. Ricardo and his comrades-in-arms were out to put a stop to the activities of those who had the power to print and issue money, because they deeply distrusted them […]". Sayers (1953, p. 47) has pointed out that the Ricardian emphasis on long-run forces "prevented him from realizing the potentialities of banking policy, but also lent to much of his exposition an air of unreality that wakened its political effect, and I would go so far as to say that it prevented him from perceiving certain major inconsistencies in his general position".

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