**A Proposed Monetary Determination of International Prices[[1]](#footnote-1)**

Pedro Siqueira Machado[[2]](#footnote-2)

**Abstract**

Trade in intermediate goods has grown in importance over the past decades. However, there is an apparent inability of trade theory to deal with it. The best place to look for an explanation is in the classical theory, which puts emphasis in the circular aspect of production. There has been two main strands since Sraffa’s rehabilitation of classical political economy: Steedman and Shaikh. I argue below that both have theoretical shortcomings when it comes to the determination of international prices. I propose a third route for a classical trade theory, what I call a Monetary Determination. It is a theory that is institutionally dependent, made to rely on the fact that international settlement of accounts is based on a fiat currency (dollar). The new determination inverts the common logic inherited from Ricardo, where one determines first the international prices with some theoretical justification (like balanced trade in Ricardo). Then domestic prices are conditioned by the international prices. In the Monetary Determination proposed here, the domestic prices are determined by the conditions of production and the state of distributive conflict. Then, in a range of cases, it is the domestic prices that regulate the international prices. A series of implications for trade theory is also discussed: like specialization and the trade balance.

**Resumo**

O comércio de bens intermediários cresceu em importância nas últimas décadas. No entanto, existe uma aparente incapacidade da teoria do comércio em lidar com isso. O melhor lugar para procurar uma explicação está na teoria clássica, que enfatiza o aspecto circular da produção. Houve duas vertentes principais desde a reabilitação de Sraffa da economia política clássica: Steedman e Shaikh. Argumento abaixo que ambos têm deficiências teóricas quando se trata da determinação dos preços internacionais. Proponho uma terceira via para uma teoria clássica do comércio, o que chamo de Determinação Monetária. É uma teoria que é institucionalmente dependente, baseada no fato de que a liquidação internacional de contas é baseada em uma moeda fiduciária (dólar). A nova determinação inverte a lógica comum herdada de Ricardo, onde se determina primeiro os preços internacionais com alguma justificativa teórica (como o comércio equilibrado em Ricardo). Então os preços domésticos são condicionados pelos preços internacionais. Na Determinação Monetária aqui proposta, os preços internos são determinados pelas condições de produção e pelo estado de conflito distributivo. Então, em uma série de casos, são os preços internos que regulam os preços internacionais. Uma série de implicações para a teoria do comércio também é discutida: como a especialização e a balança comercial.

**Keywords:** Surplus approach, international trade, terms of trade, intermediate goods, specialization.

**Palavras-chave:** Abordagem do excedente, comércio internacional, termos de troca, bens intermediários, especialização.

**Área Anpec:** Economia política.

**JEL Codes:** F10, B51, D46.

1. Introduction

Trade in intermediate goods (or inputs) has always been a characteristic of the capitalistic world economy. This is evident in trade statistics from 19th-20th century underdeveloped economies which exported mostly goods in a raw state or with little processing.[[3]](#footnote-3) Developed countries imported those goods to transform them into consumer goods or more sophisticated inputs for the domestic and international markets.

More recently, most authors point to a period after the 1960s or 70s, this characteristic has reached unprecedented levels. Production has become increasingly dispersed amongst countries. This trend has gained different names in the literature that correspond to the same process, albeit with some qualitative differences, like: global commodity/value chains (Gereffi, 1994; Hopkins and Wallerstein, 1986; Kaplinsky, 2013); offshore outsourcing or “offsourcing” (Winkler and Milberg, 2011); international vertical disintegration (Baldone, Sdogati and Tajoli, 2006).

However, there is a mismatch between what the literature recognizes as an important element of the modern world and what the theory of international trade can deal with. The best suitable place to look for a trade theory that deals with international trade of inputs is in the classical theory. This kind of theory places in the forefront the idea that production is a circular process, taking commodities in and letting commodities out. This is what Sraffa’s title “*Production of commodities by means of commodities*” (Sraffa, 1960) refers to.

After Sraffa’s rehabilitation of classical economics, the whole body of thought had to be updated. In the international trade aspect two main strands emerged: one spearheaded by Steedman (1979a; 1979b) and another one by Shaikh (1979; 1980; 2016). The former is closer to Sraffa’s own formulations, while the latter sells itself as a Marxist formulation. Irrespective of that, both are the most advanced treatment of trade theory after Sraffa’s contributions and both try to incorporate trade in intermediate goods. One of the main topics that a trade theory has to address is how to theoretically define the international relative and monetary prices.

We find that both strands have their own intrinsic problems when determining international prices. Those problems have been dealt with more extensively elsewhere. Shaikh’s construct imposes that capital is completely mobile across countries, in opposition to Ricardo’s model that had immobility of capital. Then, the countries’ normal profit rates tend to be the same. For this to work, it requires that there are always capital flows that can close any trade imbalance that might emerge. With those assumptions Shaikh can determine the international relative prices and the normal profit rate. Both the fact that the countries’ share a normal profit rate and that capital flows are unrestricted do not seem to be verified in reality.

Steedman, on the other side, has a different problem. His model assumes immobility of capital, just like Ricardo. In order to determine the international relative prices he has recourse to a balanced growth equation (Cambridge equation as Pasinetti calls it). He is able to determine the international relative prices but cannot explain how and why the prices in each country should be governed by it. He just assumes that this is true. We find this a shortcoming of his model.

Besides that, in the past 15-20 years there has been a growing literature dedicated to reinterpreting Ricardo’s trade model (see Ruffin, 2002; Maneschi, 2004; Senga, Fujimoto & Tabuchi, 2016; Gerhke, 2015; and Bhering, 2017). Those argue that Ricardo can determine the international relative prices by given reciprocal demands and a condition of balanced trade. This goes against the conventional interpretation, which probably started with John Stuart Mill, that Ricardo’s model was incomplete. According to this new interpretation, Ricardo can also justify that this international relative price governs the prices in each producing country. To do this, Ricardo needs a sort of Quantity Theory adjustment (Takenaga, 2013).

In the present paper, we propose an alternative way to determine international relative and monetary prices. To do this we find the need to move away from Ricardo’s concept of an international trade based on a produced commodity (gold). The international monetary system is shown to be based on a fiat currency that is emitted by a single country, this is the dollar emitted by the USA. Taking this into account, we find that international prices are governed by the monetary prices in each competing country. This is in a way an inversion of Ricardo’s reasoning; the countries’ monetary prices regulate the international prices and not the other way around.

Questions regarding the trade balance are also considered. However, instead of determining the international relative prices, the trade balance determines if a given configuration is economically stable or not. So, not every way of going from the national monetary prices to the international prices is stable. This emerges from the fact that only the USA can theoretically finance any deficit in its trade account. Most other countries need to export something to get dollars and then be able to import whatever it needs.

Besides the introduction and the conclusion, this paper is organized in four sections. The first section deals with the fact that monetary costs are more important than comparative costs to determine which country sells what at any moment. We introduce the assumption that both real wages and nominal wages can somehow be taken as given. This is an unusual assumption for a Sraffa type model, so the second section tries to justify those assumptions. The third section explains in more detail our concept of the international monetary system based on the dollar and the consequences for international prices. The fourth section evaluates the stability conditions from the balance of trade question.

1. Monetary costs and specialization

We will start from a simple fact: at any moment, the country that will produce and sell any commodity is the one that can supply it at the cheapest monetary cost.[[4]](#footnote-4) For example, if country can produce and export corn at a cheaper monetary price than country can produce it, country will import its corn requirement from country . Of course, that will be true after a common unit of measure has been established; fifty dollars are not immediately comparable to fifty sterling pounds. This tendency reflects Stuart Mill’s introduction to international trade where he inquiries about “The causes which occasion a commodity to be brought from a distance, instead of being produced (…) as near as possible to the market where it is to be sold for consumption” and says that a superficial answer would be “that it is cheaper to import than to produce them” (Mill, 1968[1871], p. 587). However, the author goes on to look for the reason behind the reason.

For Stuart Mill, this ultimate reason is essentially the one governed by the “law of comparative costs”. This states that international trade is regulated by the relative costs of producing each commodity. If the cost of producing corn with respect to the cost of producing iron is lower in country than in country, then country will export corn while country will export iron (the corollary is that the cost of producing iron with respect to the cost of producing corn is lower in country than in country ).

How could Stuart Mill connect the simple fact with the law of comparative costs? The question is as follows: assume country can produce both iron and corn at a cheaper monetary cost than country . By monetary cost we assume that a common unit of measure is being used in either country; say that this common unit is the dollar. So, this means that the dollar cost of producing both iron and corn is lower in country . This could happen irrespective of the presence of comparative cost advantages, meaning that the relative cost of producing corn with respect to iron in could still be lower than in . Evidently, at this stage country will produce and export both goods. In other words, the geographic location of production would be determined by absolute monetary costs.

The question can be formalized with the use of prices of production equations. Assume that each country has a method of production for both iron and corn, the method being possibly different between countries. In each country corn is produced using some amount of iron as input, iron is produced with some amount of iron as input, while workers consume only corn. The prices of production for each country can be represented as:

|  |  |  |
| --- | --- | --- |
|  |  | ( 1 ) |

|  |  |  |
| --- | --- | --- |
|  |  | ( 2 ) |

where the superscript indicates if it refers to country or and the rest of the notation is standard. The systems are indeterminate, each one has more unknowns than equations.

With the knowledge of the countries’ real wages, it is possible to determine the relative prices in each country that would equalize the domestic profit rates. By assumption, workers only consume corn. So, a given real wage means a given quantity of corn () that workers can acquire with their nominal wages: and . Substituting those into system ( 1 ) and ( 2 ), respectively, reduces the systems to only two unknowns each: the relative prices and , and the profit rates and .

This allows for a formal definition of the comparative cost advantages. Country will have a comparative cost advantage in producing corn if . The other side of the coin is that country has a comparative cost advantage in producing iron. For simplicity, assume that this holds true.

Notice that the definition of comparative costs depends only on the ratio of costs in each country. As we have previously hinted at, can country outsell country in both goods? For this to happen, country would need to show lower monetary costs for each good with respect to . So, it would need and . To determine if that can happen it is required a way to define not only relative prices but also monetary prices. For example, we could take as given the monetary wages and . Knowing the money wages, it is easy to determine what would be the monetary prices that would have to rule in each for production to be profitable. The monetary cost of corn in each country would be completely determined by the real wage and the money wage: and . The monetary cost of iron would come from the relative price determined from systems ( 1 ) and ( 2 ) above as sole functions of the money wage and the real wage.[[5]](#footnote-5)

Then, a low enough money wage in country would make it unprofitable to produce any of the commodities in country . Exactly how low the money wages in would have to be with respect to the money wages in for country to outsell country in everything will depend on the technical coefficients, and the given real wages. This allows for a formal definition of absolute cost advantage. Country has an absolute cost advantage in producing the good if , .

If, for example, country can profitably produce corn and iron at respectively and while country would need and in order to produce those goods, country would be in a position to export everything to country . Even though, country has a comparative cost advantage in producing iron ().

A recourse to a “law of one price” would also not solve the problem. This only states that the prices at which the commodities are sold is the same in both countries (leaving aside transport costs). So, this would simply imply that the commodities are sold at country ’s prices in country .

Another implication of the above exposition is that a large enough inflation in country could possibly revert the scenario, making it incapable of selling either goods in the international market. Alternatively, there could be a large enough deflation in country . For example, a one period proportional[[6]](#footnote-6) inflation of 60% in country would make and . If monetary costs in country have remained intact, its producers of iron will now be able to outcompete country ’s producers (). At this point, it could be said that the geographic location of production is determined according to the comparative cost doctrine: country exports corn while country exports iron.

It would also be possible for changes in nominal exchange rate to modify the absolute cost advantages. Since we are measuring the monetary costs in each country at the same unit of measure, it means that there is a rate of exchange for one monetary unit into another. In reality the given monetary costs in , for example, should be represented as and , where and are given amounts of country ’s currency and is the nominal exchange rate. So, if there is a large enough devaluation of ’s currency (), it could acquire absolute cost advantage in one or more of the commodities. This happens because a rise in would imply in a fall in both and . An appreciation of ’s currency is the reciprocal of a devaluation of ’s currency.

Hence, the comparative cost doctrine requires a mechanism that explains the convergence of monetary costs. In the simple model above, it would require that and , when those are measured in the same unit. Comparative costs will only ultimately determine the location of production if those inequalities can be theoretically justified. Otherwise, if the initial money prices prevail, country will be able to outsell country in both goods.

The classical authors, like Ricardo and Stuart Mill, had a mechanism to explain this that involved an understanding of the international monetary arrangement based on gold. Both argued that when the trade between countries was not balanced, meaning that imports do not exactly match exports, the difference would have to be paid in gold. So, in the example above where country outsells country in every commodity, country would import everything from country and would have to give gold in exchange. This inflow of gold into country would have as an effect to increase the monetary costs, while the outflow from country would lower its monetary costs. This happens through a sort of quantity theory of money. This inflation in country would go on until country could produce and export something at an equilibrium level of the international relative price with country producing corn and country producing iron. At which point the process would stop differs between authors. Ricardo and Stuart Mill could determine the resting position, albeit in a different manner,[[7]](#footnote-7) by recourse to the fact that trade must be balanced.

1. Real and monetary wages

Section 2 relied on the assumption of taking both the real and the nominal wage as given inside a country. This is not the conventional way. Sraffa for example in *Production of Commodities* (Sraffa, 1960) takes either the real wage of the profit rate as the given distributive variable. Therefore, there is a need to justify our unusual assumptions. If the reader has no problems with those assumptions, this section may be skipped.

First, we can give a justification based on an extrapolation of Sraffa’s assertions. In paragraph 44 of his book (Sraffa, 1960, p. 33) Sraffa finds the need to justify why he changed from an assumption of a given real wage to a given rate of profit. A long quotation is illuminating:

The choice of the wage as the independent variable in the preliminary stages was due to its being there regarded as consisting of specified necessaries determined by physiological or social conditions which are independent of prices or the rate of profits. But as soon as the possibility of variations in the division of the product is admitted, this consideration loses much of its force. And when the wage is to be regarded as ‘given’ in terms of a more or less abstract standard, and does not acquire a definite meaning until the prices of commodities are determined, the position is reversed. (Sraffa, 1960, p. 33)

What Sraffa is saying is that Smith’s, Ricardo’s, and Marx’s way of determining natural wages as given by “physiological or social conditions” is not as straight forward in a setting where workers can participate in the appropriation of surplus product. However, according to him, “The rate of profits, as a ratio, has a significance which is independent of any prices, and can well be ‘given’ before the prices are fixed” and suggests that it might be determined by the “level of the money rates of interest” (*ibid*). This suggestion has sparked a long discussion in the literature (see, for example, Pivetti, 1991; Panico, 1988; Serrano, 1993). We shall not follow on Sraffa’s suggestion though.

Sraffa dismisses a mechanical or technical determination of distribution. In a reply to a letter from Garegnani, asking about the determination of the profit rate by the money rate of interest, Sraffa says: “I do not have any intention of putting forward another mechanical theory which, in one way or another, reiterates the idea that distribution is determined by natural, technical, or even accidental circumstances” (Sraffa’s Archives, D3/12/111/154 recto, free translation)[[8]](#footnote-8). So, a real wage that cannot diverge for significant periods of time from a socially minimum necessary to reproduce workers as in Smith, Ricardo, and Marx[[9]](#footnote-9) is not the best starting position for the analysis.

The real wage is the nominal wage divided by the cost of the wage basket. Overly simplified, the real wage can be written as , where is the nominal wage and the price of the wage basket. By admitting that workers can participate in the division of the surplus, the real wage acquires a much more malleable characteristic. Malleable not in sense that it is flexible to ensure full employment as in the marginalist tradition. It is malleable in the sense that shifts in the political configuration of society can affect **permanently** its level. This could not occur with a natural wage given by a minimum that allows for reproduction of workers.

The result of political shifts that can affect real wages has to be variations in the nominal wage and/or the price of the wage basket. We will show that in a model with inconsistent claims on distribution that inflation can be such as to change the distributive outcome.

* 1. *Okishio’s inconsistent claims model*

Rowthorn (1977), working in a Kaleckian framework, proposed a model in which workers’ fight for higher wages or capitalists’ aggressive profits policy will cause a rising inflation, but more importantly it will cause a change in distribution. This gave rise to large literature on the subject. For example, in Latin America there was the discussion on the “inertial inflation” (see Serrano, 2010 and Moreno & Modenesi, 2014 for a critical review).

Okishio (1977) presented a model closer to Sraffa’s prices of production system. In it, workers and capitalists aim at a desired distributive outcome, with higher real wages and higher profit rates respectively. To try to achieve this, workers push for raises in their nominal wages and capitalists try to raise the monetary prices. However, given the technology those claims are not compatible, for workers to get their desired real wages capitalists must face a lower profit rate and vice-versa.

In Okishio’s model there is no mechanism through which workers can directly influence nominal prices or capitalists influence the nominal wage. This assumption simplifies the shape of each class’s “behaviour equations”. The behaviour equations are simply a system of difference equations regarding the dynamics of nominal prices and nominal wages. The model is built for a single country, or a closed economy. So, there is only one country. To simplify the exposition even further, we will assume a one commodity model. At the starting period the configuration is as follows[[10]](#footnote-10):

|  |  |  |
| --- | --- | --- |
|  |  | ( 3 ) |

where is the price of this single good, is the input requirement of this good to produce one unit of itself, is the profit rate, is the unitary requirement of labour as input, is the nominal wage, and is the real wage. The technical coefficients are assumed not to change from period to period. The index indicates that this refers to the starting period. Okishio further assumes that capitalists have a desired profit rate and workers a desired real wage .

The idea that neither capitalists nor workers are satisfied with the current outcome would imply that both and . As said previously, capitalists try to reach by raising nominal prices and workers try to reach by raising nominal wages. Capitalists do that by adopting a price policy in that imposes over the costs in . While workers raise their nominal wages in such a way that they would achieve if prices stay as in . Formally, those behaviour equations can be expressed as the system of difference equations:

|  |  |  |
| --- | --- | --- |
|  |  | ( 4 ) |

Neither workers nor capitalists will be able to reach their desired outcome. This will happen because: 1) from capitalists’ point of view both the prices of inputs and the nominal wage will rise, curbing the actual outcome; 2) from workers’ perspective the price of wage goods will rise, also curbing the actual outcome. The result is that neither class is strong enough to reach their desired outcome.

The incapacity of either class to achieve their desired outcome will have the effect that prices and nominal wages will continuously rise, from period to period. This is the “wage-price spiral” (Okishio, 1977, p. 22). Okishio emphasizes that this spiral comes from the fact that both capitalists and workers are unsatisfied with the actual outcome.

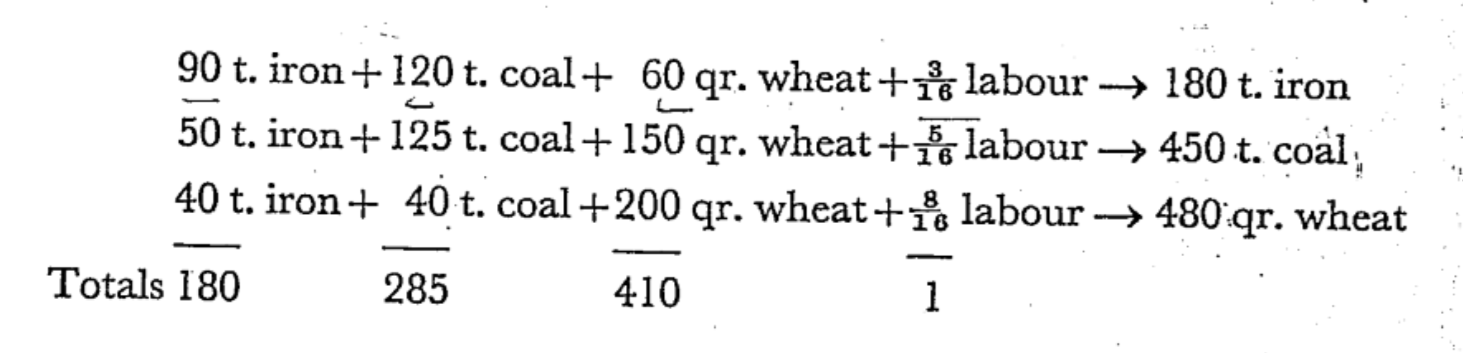
Okishio, using some results developed in Nikaido (1968), can achieve some long run results. He shows that the rate of growth of nominal wages and prices tend to be the same. So, after enough time has passed, real wages and profits rates converge to some level. Okishio resumes that in:

if capital and labour pursue their incompatible requirements and raise prices and wages respectively, then the ceaseless rise in prices and wages occurs, and at last some kind of equilibrium state comes out, where capital can not raise the profit rate by raising prices nor labour the real wage by raising the money wage. (Okishio, 1977, p.24)

This “equilibrium” level of the real wage will be smaller than the one desired by workers. However, it will not be as low as the one compatible with capitalists desired profit rate. As a corollary, profit rates will not be as high as that wanted by capitalists, but will be higher than the one compatible with workers’ aspiration.

* 1. *An inconsistent claims model with dampening of wages and prices*

In this section we will build a model in a similar vein to Okishio (1977) to show that the real wage and inflation tends to settle down at some level. It is a three sector model that has one method of production for iron, coal, and wheat. The coefficients assumed for the production matrix are extracted directly from Sraffa’s chapter on the standard commodity:



Source: Sraffa, 1960, p. 19.

Figure 1

The unitary coefficient matrix can then be written in a matrix format as:   
 and the labour vector coefficient as . So, every commodity enters directly and indirectly into the production of every commodity. Workers only consume wheat in their wage basket. From this we will simulate a model similar to Okishio’s.

By assumption, the actual outcome in is compatible with equal sectoral profit rates, meaning that relative prices are at their natural level. Then, writing the price system in matrix format:

|  |  |  |
| --- | --- | --- |
|  |  | ( 5 ) |

where is the column vector with entries equal to the price of iron (), coal (), and wheat (). Setting and , the real wage in will be . This means that at this level of the nominal wage and of the price of the wage good, workers can secure units of wheat (whatever that might be: bushels, kilograms, etc.). The natural prices of iron and coal will be, respectively, and . The profit rate associated with this real wage will be .[[11]](#footnote-11)

As in Okishio we assume that neither workers nor capitalists are satisfied with the actual outcome at . Workers would like an increase of in their real wages from and capitalists would like an increase of in their profit rates from , meaning that and .

We propose a small difference in the model with respect to Okishio in the way that capitalists behave. Instead of assuming the price in and then basing their pricing policy in *historical* costs, we will assume that they try to reach a desired profit rate () on the *replacement* costs of produced inputs. This difference means that capitalists use in their pricing policy, instead of . With respect to the wages, capitalists use in their pricing policy as in Okishio. Workers in their desired nominal wage policy act just like in Okishio.

Let the vector of desired nominal prices in , and the desired nominal wage in . From the assumptions above, the system of “behaviour equations” is:[[12]](#footnote-12)

|  |  |  |
| --- | --- | --- |
|  |  | ( 6 ) |

This system ( 9 ) implies that capitalists and workers have a desired growth rate of prices (inflation) and of nominal wages. The desired inflation rate of the price of iron is and the desired growth rate of the nominal wage is , the rest of the sectoral inflation rates follow the same pattern.

To capture the idea that neither workers nor capitalists can achieve their desired outcome, we will add “dampening” factors to both prices and wages. In this sense, the observed outcome of the price of any good in is the price in times a fraction of the desired inflation rate;[[13]](#footnote-13) the same happens for the observed outcome of , with a dampening factor of . One interpretation of those dampening factors is to suppose that both wage and price policy are mediated by the State and are a proxy for the relative power of the classes to push for their desired outcome. In terms of a system of equations this can be represented as:

|  |  |  |
| --- | --- | --- |
|  |  | ( 7 ) |

It is possible to write this as a linear difference system. Let , with its elements represented by , which are nonnegative natural numbers. Then,

|  |  |
| --- | --- |
|  | ( 8 ) |

It is then very easy to simulate this system for different values of and . Below we provide a few examples.

a) For and :

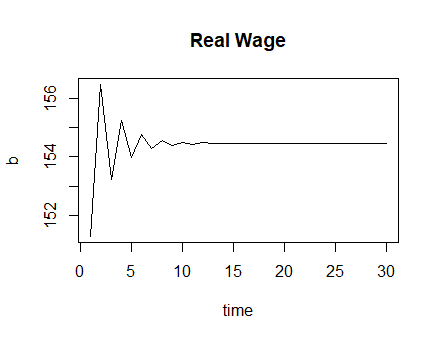


Figure 2

In a cyclical fashion the real wage converges to higher level . At this level the normal rate of profit will be lower at and the normal relative prices will be in the proportion .

b) For and :

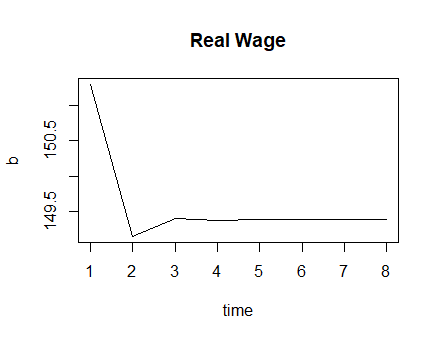


Figure 3

In a cyclical fashion, but much faster, the real wage converges to lower level . At this level the normal rate of profit will be higher at and the normal relative prices will be in the proportion .

c) For and :

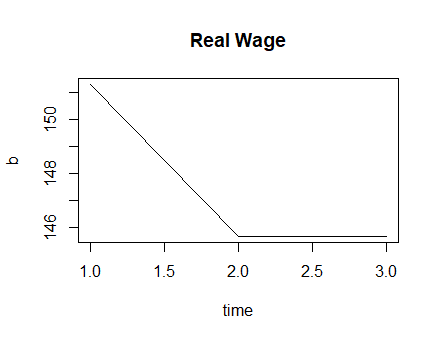


Figure 4

In this case the real wage falls instantaneously to a lower level of . At this level the profit rate is at high level of . Notice that in this case capitalists can achieve and maintain their desired profit rate. Real wages will just be compatible with it. This happens because capitalists can get the entire of their desired increase in prices, while workers are denied any increase in wages. Relative prices will be in the proportion .

d) For and :

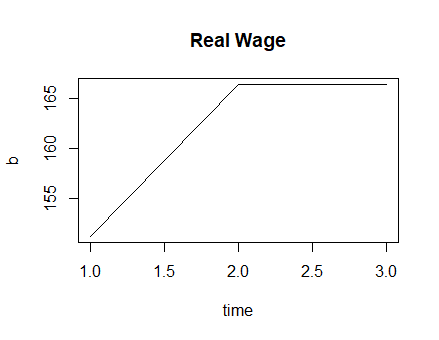


Figure 5

Analogously to the previous case, real wages rise instantaneously to the higher level of . At this level profit rate is at the low level of . Notice that in this case workers can achieve and maintain their desired real wage. The profit rate will just be compatible with it. This happens because workers can get the entire of their desired increase in wages, while capitalists are denied any increase in prices. Relative prices will be in the proportion .

e) For and :

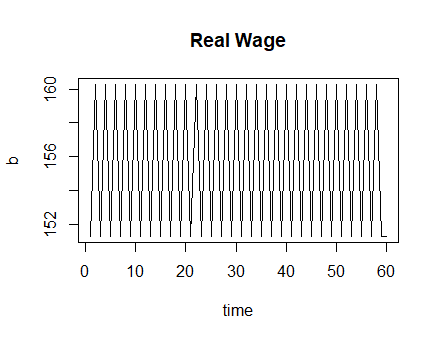


Figure 6

This is the borderline case, where both capitalists and workers can get their desired increases in prices and wages at every moment, respectively. In this scenario no class is strong enough to overpower the other and they are in an eternal struggle to restore any loss caused by the other class getting their desired increase. Neither real wages or profit rates will tend to settle at any level.

To conclude, those simulations provide basis to the previous assertion that, in a way or another, and reflect the power struggle between classes. In a loose sense, if capitalists cannot increase their prices much while workers can, real wages will increase (and profit rates fall). If workers cannot increase their wages much while capitalists can, real wages will fall (and profit rates rise). If neither class can overpower the other, no definitive outcome will emerge of this wage-price spiral.

Besides that, it also lends support to assumption in section 2 of a given real wage and nominal wage. Take simulation a) above as an example. If we truncate the series at any point , real wages will have settled at their long period position. Nominal wages at this moment will just be the cumulative result of the previous outcomes, given the starting position. The monetary prices necessary to produce each commodity, at this moment, will also be the result of a similar cumulative process. For example, at we have: , , , , and .

The idea in this section was not to provide a new theory or a new understanding of inflation. The goal was simply to give some support, using a very simple model, to the idea of taking both the real wage and the nominal wage as given. This is an assumption that became important in the last section and will resurface in the next, so there was an inherent need to justify it. In a system where workers can participate in the share of the surplus, how nominal wages and prices behave are important for evaluating the real wage. The behaviour of nominal wages and prices depend on the balance of forces between workers and capitalists. This balance of forces is captured in the simple model above by the dampening factors and .

1. The international monetary arrangement

In the past sections we have explored the idea that a country’s choice of specialization relies not only on the structure of comparative costs but also in the monetary costs. In the sense that a change in monetary costs, unaccompanied by changes in its comparative costs, could change the commodities it can produce profitably.

The current international monetary arrangement is based on the settlement of accounts through flows of a fiat currency, not gold. Most countries do not have direct access to this fiat currency and they must “produce” it by means of exportation or financial flows. In the sense that is by selling goods to other countries and getting paid in this international currency that they can have the funds to pay for imports. Alternatively, there might be financial flows not connected with trade flows. So, it is very important for those countries that they keep vigilant with their state of “competitiveness”, otherwise risk ending up without international currency and jeopardizing the reproduction of their own economy. By the state of competitiveness we simply mean that those countries have to guarantee that they can produce and export some tradable commodities (or services).

This international currency is the dollar. This way of viewing the international monetary system is similar to what has been presented as a “Hierarchy of International Currencies” (see, for example, De Conti et al, 2013; Fields & Vernengo, 2013; de Paula et al, 2017; Orsi, 2017), or what Serrano (2003) has labelled as the “floating dollar standard”. This literature emphasizes that, even though each country is not constrained by the domestic emission of its own currency, it is constrained by its access to dollars. This happens because each country has commercial links with multiple countries and the settlement of accounts are usually in dollars which they cannot emit. The literature puts the dollar at the highest level of a classification of currencies, or assets in which settlements can be made. The reason is that dollars have the highest level of liquidity, being accepted everywhere and by everyone. While, national currencies can be accepted only as part some previous international agreements and as soon as any problem arises its acceptance is put into question.

In this section it is argued that there is, at least, one country in the current international monetary arrangement that can theoretically ignore its “state of competitiveness”, namely the USA. As Serrano (2003, p. 97) puts it “the US, when controlling the issuing of international money, plays the role of the *central* bank of the world”. International settlement of accounts is made based in its own currency, meaning that it cannot run out of funds to pay for its imports. So, at least in principle, its economy could run indefinitely with a negative trade balance, or in the limit even not exporting any tradable. This does not mean that it will always choose to do so, because there might be other political constraints. For example, it might need to keep its unemployment low by protecting some key tradable sectors, or maybe some tradable sectors are vital for its military endeavour and so on. The only fact that needs emphasis is that its monetary policy need not be constrained by the need for dollars to pay for imports, as opposed to most countries.[[14]](#footnote-14)

* 1. *The determination of international relative prices under a floating dollar standard*

Recognizing this feature of the international monetary system brings some consequences to the analysis. First, the determination of monetary values in the USA has precedence over the other countries. In a sense the outcome of monetary variables in the USA conditions the outcome of other countries.

To illustrate this point, call country from the previous section the USA with its monetary costs set as and . Let country be a peripherical country, say Brazil. By assumption Brazil needs to export some commodities because it requires dollar for its normal functioning, like to pay for imported material that it cannot produce domestically. If Brazil is to produce either corn or iron, it needs to feature monetary costs such as and/or . If the first inequality is true, Brazil will produce and export corn; if the second inequality is true, Brazil will produce and export iron; if both inequalities are true, Brazil will produce and export both goods.

In terms of the systems of equations above, this means that the monetary wage () in the USA can be determined theoretically prior to the one in Brazil measured in dollars (). The political determination of the dollar wage in Brazil will depend not only on its internal class conflict, but also on its needs and desires for exportation. After knowing the monetary costs from the USA, Brazil perceives that its policies can potentially affect its competitiveness. Thus, the knowledge of and if Brazil is to export either commodity the following restrictions will apply to its dollar wage:

|  |  |  |
| --- | --- | --- |
|  |  | ( 9 ) |

and

|  |  |
| --- | --- |
|  | ( 10 ) |

Inequalities ( 9 ) and ( 10 ) are the necessary conditions for Brazil to have absolute cost advantages, as defined above, in corn () and in iron () respectively. In general, both restrictions will be different and impose two different limits for the monetary wage in Brazil.[[15]](#footnote-15) We have assumed above that the USA has a comparative advantage in corn and Brazil in iron, which implies that the limit to export iron is lower than to export corn (restriction ( 10 ) is lower than ( 9 )). So, restriction ( 10 ) will impose the upper limit for Brazil to have an absolute cost advantage in the production of both goods. Three situations emerge: (I) if is lower than either limit, Brazil will have an absolute cost advantage in both goods; (II) if is higher than either limit, Brazil will not have an absolute cost advantage in anything and will import everything; (III) if is between the limits, Brazil’s absolute cost advantage will be in exporting iron. Notice that there is no situation in which Brazil has an absolute advantage only in corn, this is a limitation that the structure of comparative costs imposes.

The policies in Brazil will then determine the international monetary and relative prices of the traded commodities, assuming that there is no reaction from the USA. For situations (I) through (III) above: (I) the international prices of both goods will be regulated by the respective monetary cost in Brazil: and , the relative price will be ; (II) the international price of both goods will be regulated by the respective monetary cost in the USA: and , the relative price will be ; (III) the international price of corn will be determined in the USA and of iron in Brazil: and , the relative price will be . As shall be clear in section 5 below, not every one of those configurations is economically stable.

This laborious exercise tells us that the international prices will be determined by the conditions of production in the country that has the lowest monetary cost. The international relative price will follow from this. This is in line with Ricardo’s remark that “it is the natural price of commodities in the exporting country, which ultimately regulates the prices at which they shall be sold (…) in the importing country” (Works, vol. 1, p. 238).

* 1. *The distributional consequences*

There are distributional implications for the different situations above. For example, in situation (I) above Brazil produces everything and the USA imports everything. The price at which the USA imports corn from Brazil is lower than what it would cost the USA to produce it itself. So, with the same nominal wage in the USA, workers will be able to buy more corn if they so wish. Also, the price of iron is lower than if it was produced in Brazil, meaning that any Brazilian sector using iron as an input would see a rise in their profit rates. The attentive reader might be asking what those sectors are and where workers are employed in the USA if it produces neither of the goods. Well, there might still be other non-tradable sectors in the country that we have omitted so far. Also, there might be State bureaucracy employing people. Since all international prices are determined by Brazil’s conditions of production, its distribution would be unaffected. Situation (II) would be the exact opposite with Brazil’s distribution changing and the USA’s not.

In both cases (I) and (II) the gains of trade are entirely reaped by one country. Namely the country that does not export anything, which is an unusual result. What is driving this result is the fact that the country that does not export anything can find everything cheaper from abroad.

Situation (III) is somewhat different. Since the price of corn, the wage good, is determined in the USA, workers with an unchanged nominal wage would still be able to buy the same quantity of corn. The purchasing power of wages would still be the same in the USA. On the other side, USA’s corn producers would see a rise in their profit rate, caused by the ability to buy iron relatively cheaper from Brazil. From Brazil’s point of view the case would be reversed. Brazil’s workers, with an unchanged dollar wage, would experience a rise in their purchasing power in terms of corn. They could import relatively cheaper corn from abroad. Since the price of iron and the nominal wage are fixed in Brazil, its iron producers would still have the same profit rate. In a sense, each country would benefit from trade, but the benefit would be entirely reaped by a single class.

The distributional results for situation (III) above depend crucially on the assumptions we have made before. More specifically on the assumptions that workers do not consume iron and that corn is not directly used as input for production. Relaxing those assumptions, what would happen is that the profit rates in both countries and the purchasing power of workers would rise. So, from a distribution point of view, the gains of trade would be spread out amongst society.

1. The balance of payments

In the previous sections it has been hinted that the balance of payments has an important role in the theory of international trade. For example, in Ricardo and Stuart Mill it is the condition of balanced trade that offers a closure to the model (see Bhering, 2017). In footnote 12 it was hinted that the balance of payments theory might also be relevant.

We shall start analysing the consequences upon the trade balance of the results obtained in subsection 4.1 above and its economic stability. The economic stability is the absence of forces that tend to change the actual outcome, in contrast with political choices that might do so.

The trade balance is the monetary value of the country’s total exports minus the monetary value of the country’s total imports. The monetary value of total exports/imports is defined by the quantum exported/imported times the prices of the goods exported/imported. Hence, it is not only a monetary magnitude as it also encompasses quantity variables. If the trade balance is a positive number, the country has a surplus in the trade account. If it is a negative number, the country has a deficit in the trade account. If the monetary value of exports matches exactly the imports, the country has a balanced trade.

So, what happens with the trade balance in cases (I) through (III) in section 4.1 above? Case (I) was defined by the condition that Brazil has absolute cost advantages in the production of both iron and corn, then the international prices are equal to Brazil’s monetary prices (times the nominal exchange rate). In the two-commodities case assumed, this implies that Brazil is exporting everything and importing nothing from the USA. On the other side, the USA is importing everything. Whatever are the quantities that Brazil exports to the USA, Brazil experiences a surplus in its trade account. This is self-evident since Brazil is not importing anything. The USA must pay its importations with dollars. For all intents and purposes, since the USA is the “central bank” of the world, they can do this indefinitely. Brazil, from the results of its trade account, will persistently accumulate dollars, which it also can do indefinitely. Hence, this case is economically stable.

Case (II) was the situation where the USA has absolute cost advantages in the production of both iron and corn, then international monetary prices are equal to the USA’s monetary prices. In the two-commodities case assumed, this implies that the USA is exporting everything and importing nothing from Brazil. On the other side, Brazil is importing everything. Whatever are the quantities that the USA exports to Brazil, the USA experiences a surplus in its trade account. This is self-evident since the USA is not importing anything. Brazil must pay its importations with dollars. In contrast with the previous case, Brazil is not the central bank of the world and cannot emit the currency in which its debt is denominated. From the trade account results, Brazil will persistently lose its dollar reserves. From the point of view of the USA this is perfectly stable, there are no economic forces to change its absolute cost advantage. For Brazil this could only be economically stable if, for whatever the result in the trade account, there were financial inflows of dollars to Brazil just enough to offset its trade deficit (for example the Mundell-Fleming model with perfect mobility of capital, and Shaikh (2016, chap. 11)). To suppose this is unrealistic.

It remains the fact that the situation is not stable, meaning that the dollar costs in Brazil must decrease so it can start exporting something. This can be achieved through changes in Brazil’s dollar wage, either the exchange rate devaluates, or the nominal wage falls, or a combination of both. There will be a correlation between the outflow of dollars and changes in the price level inside Brazil, which might indicate that some sort of Quantity Theory adjustment is in place. However, this is illusory because the outflow of dollars and the changes in the price level are both the effects of a common factor, namely the trade deficit. There is no causation from the outflow of dollars to the changes in nominal prices, nor any necessary change in Brazil’s domestic monetary base. There are no movements in the monetary prices in the USA caused by the inflow of dollars as well.

As the monetary costs in Brazil decreases, the first good in which it can attain a competitive status is the one that it has a comparative advantage (iron, as assumed). The situation then tends to be one where Brazil produces iron and the USA corn. This is exactly the case where comparative advantage regulates the international division of labour, case (III) above. We can move to an analysis of case (III).

Case (III) was the situation where the USA has absolute cost advantage in the production of corn and Brazil in the production of iron. International monetary prices of each good will follow the monetary costs of the country that produces such good: and . Contrary to the previous cases where the sign of the trade balance was independent of the quantities, for case (III) the sign of the trade balance can only be established after knowing the quantities traded.

Let and be the USA’s demand for iron and Brazil’s demand for corn, respectively. From the point of view of Brazil, the definition of the trade balance indicates that it will face surplus, equilibrium, or deficit according to the sign of:

|  |  |  |
| --- | --- | --- |
|  |  | ( 11 ) |

where the elements on the left of the inequality are Brazil’s value of exports and imports, respectively. The exact opposite is true for the USA.

If the reciprocal demands are such as to cause a balanced trade or a trade surplus in Brazil, the situation is like case (I) and it is economically stable. If the reciprocal demands are such as to cause a trade deficit in Brazil, the same kind of economic stability problems from case (II) emerge.

The question then is how those reciprocal demands are formed, which is outside the scope of this paper. However, we can give some preliminary indications. Using the same logic that the USA has theoretical priority in setting its monetary wage, it is possible to argue that its demand and output policies are logically disconnected from the output and demand policies in Brazil. The USA can pursue outputs (or employment) levels and growth rates without running the risk of ending up without dollars to pay for the required imports. So, in a sense the USA’s demand for imported iron can be taken as exogenously determined.

To produce the USA’s demand for iron, there is a requirement of corn to be consumed in Brazil. This requirement of corn will at least be equal to the number of workers employed in the production of iron times their real wages. This “induced” demand for corn in Brazil can generate, together with and , a balanced trade, or surplus, or deficit. If trade is balanced, no problem arises. If Brazil has a trade surplus, there is no immanent problem and it will accumulate dollars. However, Brazil could pursue higher levels of employment because it has more dollars than it uses in its normal functioning. If Brazil has a trade deficit, then there is a possible problem. Reducing dollar costs in Brazil will generally[[16]](#footnote-16) not solve the problem, since this will only imply in a reduced export value of iron and hence a higher deficit. There is the possibility that monetary costs (and wages) in the USA is reduced, hence reducing the value of imports in Brazil. This is not likely to happen since from the USA’s point of view there is no problem. Another option is that real wages in Brazil falls and this reduces its required quantity of imports as well. This is not a guarantee, because the real wage depends on Brazil’s balance of forces between capitalists and workers.[[17]](#footnote-17) If those two things fail to occur, then for the USA to keep its nominal wage and output policy it must guarantee the sufficient financial flows to Brazil.

Those financial flows that guarantees the USA’s policies do not mean that any trade deficit is immediately closed by flows of capital. They are relatively autonomous and depend on technology, the USA’s employment, and distribution. If, for example, Brazil tries to pursue an even higher output it will run again into higher trade deficits. And then there will be no financial flows to cover the gap, as would happen in Shaikh’s model (Shaikh, 2016, chap. 11). What those financial flows mean is that if the USA is to pursue some aggregate demand policy, it might run into problems to find the necessary supply of inputs from imports. To sustain its aggregate demand policy it also must, at least, finance its external suppliers that are running out of dollars (or, as indicated in footnote 15, to give support to the suppression of the labour force in those countries).

Those remarks are only meant to indicate the way in which the monetary determination of international prices proposed above can be used to analyse the trade balance and balance of payments issues that may arise. Balance of payment issues has been a recurrent problem in the world economy, especially in peripheral countries.

1. Conclusion

This paper has tried to propose an alternative determination of international relative and monetary prices. This a core issue in any trade theory and thus the paper serves as a contribution to the debate on international economics.

We have shown how the monetary costs in the competing countries regulate the international prices. The paper starts considering the question that monetary costs are more important than comparative costs to determine which country trades what at any single moment. So, monetary costs affect the countries’ specialization pattern. We show this using unusual assumptions that both the real wage and the nominal wage can be taken as given.

After that we justify our unusual assumptions by recourse to an inconsistent claims model. This is an iteration of Okishio’s (1977) contribution. It shows that if capitalists and workers desire an outcome that is either better than the actual one and mutually incompatible, a wage-price spiral emerges. The wage-price spiral results in some positive level of inflation and the real wage. If the conflict is not too strong, distribution settles at some level. A fall of rise in real wages (profits) will depend on how strong each class is. After the real wage has settled at its “long-period” position, prices and nominal wages rise at the same rate. Then it is argued that both the nominal wage and the real wage can be taken as a given at any specific moment.

Following this, we have discussed the fact that there is one country that emits the international currency. This has implications for the trade theory in so far as this country cannot have balance of payment problems. The determination of international prices is shown to depend on the other countries’ wage and price policies. Those also determine specialization.

At last we analysed some problems that emerge from the fact that the countries, apart from the USA, need to export something to acquire dollars. This condition imposes a stability requirement for the monetary determination of international prices and specialization. A situation in which Brazil is in surplus and the USA is in deficit is economically stable. This situation can last indefinitely if the USA does not take a unilateral decision to change it. A situation in which Brazil is in deficit and the USA is in surplus is usually not stable, since Brazil will eventually run out of dollars to pay for its imports. It is only stable if the trade imbalance emerges from the USA’s output/employment policy and it must be sustained with capital flows to Brazil.

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1. This is a draft, please do not quote from it. The author is thankful for comments to previous versions of this paper by Guilherme Haluska, Andrew Trigg, and Ariel Wirkierman. All errors and omissions remain my own. [↑](#footnote-ref-1)
2. PhD student at The Open University. Email: pedro.siqueira-machado@open.ac.uk. [↑](#footnote-ref-2)
3. Brazil is a fine example. Abreu and Bevilaqua (1996) shows that between 1850 and 1960 75% of Brazil’s exports, on average, consisted of little processed goods (mainly coffee beans, sugar, cotton and rubber). [↑](#footnote-ref-3)
4. As Faccarello (2017) has argued, the metaphor that a “country produces, a country decides” and so on is fictious. Capitalist economies usually do not take decisions at this level, rather it is individual producers that decide on production. However, the metaphor is simple and pedagogic. It is shown that a “country decides” to produce something whenever this good is capable of rendering the normal rate of profit. This is completely compatible with a story where individual capitalists, in search for the highest rate of profit, decide to produce this good. [↑](#footnote-ref-4)
5. In the simple case above: , , , and . [↑](#footnote-ref-5)
6. Proportional in the sense that the prices of both goods rise at the same rate. [↑](#footnote-ref-6)
7. See the book edited by Senga, Fujimoto, and Tabuchi (2017) and Bhering (2017) for an in-depth discussion of those differences. [↑](#footnote-ref-7)
8. Any reference to Sraffa’s archives refer to the online catalogue available at [Trinity College Library, Cambridge: SRAFFA](https://janus.lib.cam.ac.uk/db/node.xsp?id=EAD%2FGBR%2F0016%2FSRAFFA). [↑](#footnote-ref-8)
9. The theory of wages in the classics is, admittedly, much more sophisticated than this. Smith and Marx offered a very rich analysis of its formation (see Stirati, 1992). The fact remains that it is determined by the minimum level that permits reproduction of workers, whatever social and institutional factors can influence it. We would prefer to have room for “sudden changes”, like the election of a left wing party, to persistently influence distribution. [↑](#footnote-ref-9)
10. Okishio builds his model with wage as part of the advanced capital. We have reverted this option, so it is closer to the model built in section 2 above. [↑](#footnote-ref-10)
11. Any discrepancies are caused by rounding up the numbers. [↑](#footnote-ref-11)
12. . If is smaller than the maximum rate of profits, then exists and is nonnegative. [↑](#footnote-ref-12)
13. Pivetti (1991) and Serrano (2010) indicate that the money interest rate imposes some limits to the growth rate of prices. The model above is more abstract. [↑](#footnote-ref-13)
14. Not every country is the same, the ability to acquire dollars outside of exportation varies wildly from country to country. It is not surprising that balance of payment constrained models springing from Thirlwall’s contribution (Thirlwall, 1979) have had a bigger impact on peripherical countries. [↑](#footnote-ref-14)
15. They will only be the same limit if, and only if, . That would mean that neither country has a comparative advantage, because relative costs will be the same in both countries. This can be regarded as a fluke condition. Any change in technology and/or real wages will cause it to move away from unity. The assumption from before that Brazil has a comparative advantage in producing iron and the USA in corn implies that this term is smaller than unity. [↑](#footnote-ref-15)
16. It would only solve the problem if the fall in the dollar wage in Brazil is so great to make it acquire absolute cost advantages in corn as well. If that is the case, the situation falls back to case (I) above. [↑](#footnote-ref-16)
17. We are not denying that a trade deficit can be used to weaken workers’ political force and reduce the real wages. This strategy has been used throughout capitalist economies. A famous example is the situation of Latin America’s “lost decade” in the 1980s and the subsequent adoption of ‘neoliberal’ policies. However, this is not a logical necessity. [↑](#footnote-ref-17)