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A Note on Juglar, Bonnet and the Intuition of the Interest Parity Relation

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Abstract: It is a commonly accepted view that the parity theory of forward exchange based on the law of one price was first formulated by Keynes (1923). In this article we assess the preliminary shapes of the Interest Parity (IP) relation. After reviewing the early beginnings of the IP relation we investigate two French economists of the mid 19th century who have hitherto received no adequate attention. We argue that Bonnet (1866) and Juglar (1866) ought to be considered as pioneers in the assessment of IP relation since Goschen's contribution (1861) is related to the specificity of "long" exchange rates at bimetallic time.

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It is a commonly accepted view that the parity theory of forward exchange based on the law of one price was first formulated by Keynes (1923). "*Forward quotations for the purchase of the currency of the dearer money market tend to be cheaper than spot quotations by a percentage per month equal to the excess of the interest rate which can be earned in a month in the dearer market over what can be earned in the cheaper*"[3] (Keynes, 1923, chapter 3, pp. 115-39). Forward exchange trading gave rise to the notion of covered interest parity (CIP), which related the differential between domestic and foreign interest rates to the percentage difference between forward and spot exchange rates.

Einzig (1962, p 275) corroborated this view: "*Keynes was the first to present the Interest Parity theory in a systematic form, in his articles in the Manchester Guardian Reconstruction Supplement and in his Tract on Monetary Reform. According to his theory, forward margins, expressed in percentage per annum, tend to be equal to the difference between interest rates in the two centres and tend to fluctuate around the 'interest parities' in accordance with supply and demand. Keynes laid down the rule that whenever they departed from their interest parities to an extent of at least half per cent per annum, interest arbitrage set into motion transactions which tended to readjust them. Deviations of a lasting nature were liable to arise, however, among other reasons, because the liquid capital available for arbitrage was not unlimited and at times it was not large enough to bring about readjusment*" (Keynes, 1923, pp. 7-15). Einzig (1937) surveyed additional "*post – Tract on Monetary Reform*" European literature over the inter-war period and found it to be relatively poor, as compared to Keynes' (1923) seminal contribution. Indeed, the English, German, French and Italian literature during the inter-war period (see, references) mostly dealt with practical material and according to Einzig (1937) "*drew extensively upon the material provided by Keynes (1923) without carrying the theoretical aspects of the subject much further*" (p. 155).

[3]This refers to the situation of covered interest parity. In modern economic language, the covered interest parity (CIP) theorem states that the interest differential between two assets, identical in every relevant respect except currency denomination, should be zero once allowance is made for cover in the forward exchange market and the relevant transactions costs.

Algebraically, the CIP condition is usually expressed (ignoring transactions costs) as:

(1) $F/S= (1+i^*)/(1+i)$

Where i and i* are, respectively, the domestic and foreign interest rates on similar assets of a certain maturity, S is the spot exchange rate (foreign price of domestic currency) and F is the forward rate (i.e., the rate agreed now for an exchange of currencies in the future) of same maturity as the interest rates.

An approximation to (1) is also sometimes used:

$f – s = i^* - i$,

Where f and s denote the natural logarithms of the forward and exchange rates respectively.

Sources: Mark. P. Taylor, The New Palgrave.

What about the preliminary shapes of the Interest Parity (IP) relation? We shall focus below on the literature prior to Keynes (1923). According to Einzig (1937), "*all various works have remained more or less isolated and the same truths have had to be discovered independently*" (p. 156). After reviewing the early beginnings of the IP relation in section 1, we shall investigate more precisely in section 2 some French economists of the mid 19th century (notably, Bonnet (1866) and Juglar (1866)) who have done part of pioneer work in this field but have hitherto received no adequate attention. Amazingly, the economic posterity caught attention to the general framework of Juglar's crises' theory but absolutely not to the manifest content of the crises' episodes he described. This remains an enigma. We also argue that Einzig (1937, 1962) assimilated wrongly the description of the "long" exchange rate by Goschen (1861) with an intuition by this author of the IP relation. We explain why Bonnet (1866) and Juglar (1866) ought to be considered as pioneers in the assessment of IP relation without forward markets since Goschen's contribution (1861) is related to the specificity of "long" exchange rates at bimetallic time.

1. The early beginnings of the IP relation

Pre-war writers about the IP relation appear to be few. Einzig (1937, p. 149) mentioned H. Deutsch (1914, p. 174) who described the working forward exchange market between London and New-York prior to World War 1: "*the New york price of forward Telegraphic Transfer (tt) London will depend upon the discount rates in London and in New York. Therefore, when the discount rate in New York is the same as in London, the price of forward tt will be identical with the price of prompt tt. If money in London is cheaper than in New York, then the forward rate for tt London must be dearer than the rate for prompt tt London, and should the opposite take place then forward rate for tt London must be cheaper than the rate for prompt tt London. Of course at times the actual rate for forward tt London may not be in harmony with these rules, as the rate of exchange is subject to the law of supply and demand*". This can be considered as the interest parity theory of Forward exchange in its rudimentary form. One can suppose that Deutsch paid attention to the vivid expansion of organized trading in forward exchange between London and New York just prior to World War I.

Apart from Deutsch (1914), (Einzig, 1962) mentioned an isolated exposition by german economist Walther Lotz (1889). "*It was not until the early nineties that we encounter an isolated attemp at elaborating a Forward Exchange theory. Not surprisingly the first economist to deal with it was a German economist, Walther Lotz, who showed himself aware of the relationship between interest differentials and forward rates. He even realized that the forward rate was determined not by one interest rate but by several*" (Einzig, 1962, pp. 214-215). Indeed, Walther Lotz' article published in 1889 is considered as one of the earliest sources of information on forward exchange and deals with the impact of interest rates on

forward rates. Dealing with the (existing) Vienna forward market in mark notes, he stated that the premium on forward mark notes was due to the lower interest rates prevailing in Germany. He also noted that the forward rate was influenced not by a single but by several interest rates, notably the market rate of discount for prime bills and the interest rate on Bourse loans. He quoted that the reaction of forward rates to changes in interest rates was very prompt and developed an example (p. 36). Whereas interest rates in the 1880s were usually higher in Vienna than in Berlin, on September 29, 1888, the rate on Bourse loans in Berlin rose suddenly to 8 %, while it was at 6% in Vienna. Immediately, on that day, the forward rate for mark notes in Vienna registered a 1.5% discount while regularly it stood at the premium[4].

To explain the relative scarcity of the pre-war literature on IP relation, Einzig (1962) noted that "*almost all writers on Foreign exchange theory during the 19th century confined themselves to dealing with spot exchanges, even though during the second half of the 19th century there must have been in practical banking circles a fairly widespread knowledge of the Forward exchange market, especially in Austrian gulden and Russian roubles*". (Einzig, 1962, pp. 214-215). Obviously, the understanding of the forward exchange market requested the development of forward markets. During the second half of the 19th century, spot exchange markets were much more developed than forward exchange markets.

In this context of predominant spot exchange markets, Einzig (1962, p. 213) mentioned Goshen's contribution (1861, 1863 – 2nd ed.) as crucial: "*Goshen explained with much clarity the relation between interest differentials and the margin between specie points. In this respect he prepared the ground for Weill's theory (1903) on the international 'solidarity' of money markets which presents a detailed analysis of the way in which interest arbitrage and the specie point mechanism between them tended to mitigate discrepancies of interest rates between centres with a good money market and a good Foreign exchange market*"(see Goshen, 1863, p. 140-144).

If Goschen (1861) can be considered as one of the main authors who analysed the conditions of exchange rate stabilisation in the pre-1873 double standard international monetary system, we develop below why assimilating him to the first discoverer of the IP relation is probably wrong. Did he give evidence of interest parity ahead of time, at time characterised by lack of forward exchange for the pound and the franc? Forward exchange markets only appeared in London after the 1860s and especially with countries which did not guarantee the convertibility of banknotes causing in return wide exchange rate variations,

[4]"*Am 29. September 1888 stand nämlich der Satz für Effektenprolongationen in Berlin ausnahmsweise bedeutend höher als in Wien. Sofort wurde dies von Wiener Banquiers benutzt, die in Wien Geld zu 6% p. a. aufnahmen und dasselbe zu 8% zu 8%, ja 10% p. a. in Berlin ausliehen. Für diesen einen Tag war hiervon die Folge, dass in Wien Marknoten einen Deport von 1 ½% erzielten, d. h. dass der Terminpreis sich wohlfeiler stellte als die Kassanotierung*" (Lotz, 1888, p. 36)

Russia, United States and some central European countries (see for that Einzig, 1937, pp. 37-50). In fact, over the bimetallic period, the relevant exchange markets were not as nowadays the spot and forward ones, but the short and "long" ones. The purchaser of a long bill got the foreign currency three month later at an exchange rate whose level was acted at the issuance of the bill. This way could be considered as an hedging process against currency risk but this technics was not a forward exchange. Indeed, the payment in domestic currency was done, not when the foreign currency was delivered but at the moment when the bill was purchased. According to Boyer-Deleplace-Gillard (2001), "*the long bill is in fact an instrument of short term investment, alternative to the inland bills which may be purchased on the domestic monetary market. It combines an exchange and an investment, and so we may consider its market as the international monetary market of the time, which takes place where short and long exchanges are quoted alongside*" (p. 8).

Goschen (1861) described nothing but the functioning of this mechanism. The relation between interest rate and exchange rate derived from this specific form of "long" exchange rate. The explanation is given by Goschen (1861, p. 136) very explicitly:

"*A bill drawn payable three months after date is bought by a banker at a price which is equal to a bill payable on demand less three months' interest, and this interest will not be that of the country where the bill is drawn but that of the place where the bill is payable: for the purchaser will have to discount the bill in the foreign country at the rate there ruling, before he can make it equally available with a draft on demand; and the drawer can suffer this deduction from the price of the bill at the same rate without loss, as, giving the foreign acceptor three months' grace before payment he will receive from him the same amount of interest until the debt is discharged by the actual payment of the bill, as he loses in the price of the bill itself.*"

Authors of the time were familiar with this kind of relation. For instance, Seyd (1868, p. 432) explained that "*the Long Exchange in either place is dependent therefore: 1st. – Upon the rise and fall of the Short Exchange, and 2nd. – Upon the variations of the Interest ruling in the place upon which Draft is made, to be added or substracted from the rate*".

On the whole, it is important to note that Goshen (1861) had a strong presumption of the existence of interest parity, but that his understanding of this relation was deeply rooted with the long exchange mechanism. The latter relied on empirical evidence that the difference in the long and short pound – franc exchange rates (for instance in Paris), was not influenced by the level of the discount rate in Paris, but by the level of the discount rate in the other place where the bill of exchange was remitted (therefore in London). This can be considered as Goschen's contribution to the intuition of the Interest Parity relation. He emphasised the role played by one of the interest rates only (the one of the place where the bill was remitted) but omitted the key role of the two. This constitutes an obvious limit to the formulation of the

interest parity relation and for this reason Einzig (1937, 1962) is probably too generous with Goshen (1861) when he implicitly treats him as the founding father of the IP relation. Goshen's contribution to the relation between interest rate and currency variation cannot be assimilated exactly to an analysis of *interest rate parity without forward exchange*. We shall argue below that the fatherhood of this intuition rather belongs to Juglar (1866) and Bonnet (1866) because these authors emancipate themselves from the framework of the "long" exchange rate to focus on the direct impact of discount rate regulation on currency stabilisation.

2. The French intuition

Far before Weill's theory on international solidarity (1903), over the bimetallic period at time when the debate on central bank 'solidarity' (whether war or co-operation) was growing on, three French authors, de Laveleye[5] (1865b), Bonnet (1866), and Juglar (1866), assessed in a very explicit way the use of the discount rate as a way to stabilise currency. Notably, Bonnet (1866) and Juglar (1866) clearly explained the core role of central banks' co-operation in sealing the defence of the parity. It is quite striking how their assessment remained forgotten or unrecognised. Yet, these two authors delivered an accurate and modern analysis which amazingly foreshadows the interest rate parity theory[6]. They explain why and how, under the constraint of the bimetallic holdings, the interventions on the discount rate on the two sides of the channel constituted a privileged and successful tool of exchange rates' regulation. The movements in the spot exchange rate, caused by international imbalances, need a corrective mechanism. In their assessment, the co-ordinated discount rate moves act as this corrective mechanism.

[5]We mention here de Laveleye (1865) only because Einzig (1962, p. 213) considered him as Goshen's first disciple. This statement ought to be qualified since nothing of such a fatherhood explicitly refers to an IP relation in infancy nor the "long" exchange rate described by Goschen (1861). Indeed, de Laveleye (1865b) only developed that moving the discount rate in one country was an efficient tool to prevent from exchange rate variations in this country. Despite he made no direct references to Goschen (1861), de Laveleye (1865b) expressed in a way similar to Goshen (1861) that rising the discount rate was the appropriate tool to correct for the "adverse exchange rate" (*change contraire*): "The experience of the current year and fifty past years enables us to precisely formulate the right prudential measures to take in international settlements. In case of *change contraire* (when the spot exchange rate depreciates) implying specie exports, let the discount rate increase so that vacuum draws metallic holdings from other places where they are still abundant" (pp. 457-458)… "Monetary crises are due to international trading imbalances which rarefy the metals on the domestic place. At the present time, the only way to avoid them or to minor their impact is to raise the discount rate which acts as a pump on the precious metal it attracts" (p. 459). In that way and in that way only he could be considered as a disciple who popularized part of Goschen's analysis. If we try to identify a disciple of Goschen in France we would rather choose Wolowski (1868): indeed, his article is a precise abstract in French of the whole book of Goschen (1861), punctuated with remarks praising the "remarkable talent of Mr. Goschen" (p. 401).

[6] The interesting point is that none of these two authors mentioned Goschen, (nor de Laveleye). Juglar (1863) is the only one to draw explicit references, among which himself (!), Bonnet, Coquelin, Courcelles-Seneuil, du Puynode, Gautier, Faignet concerning French authors and Doubleday (*Financial History of England*), Tooke (*Philosophy of Trade, History of Prices),* Wilson (*Capital and Currency)* concerning the English literature.

Bonnet (1866) observed the important changes in the Bank of England's discount rate for managing crisis and stated: "*If for many years the discount rate has changed much more in France than previously, it is due to the influence of England; it is the result of the financial solidarity between these two countries" (p. 599). "There are such close relationships between the Bank of England and the Banque de France that they are often dependant from each other, forced to act together*" (p. 606). The correlation between the changes in the discount rates on the two sides of the channel is seen by Bonnet (1866) as a proof of co-operation and co-ordination between the two issuance institutions and not a proof of war. This author breaks free from a purely metallic and domestic reading of the role of the *Banque de France* (in which the French issuance institution would only be concerned with the preservation of its specie holdings). On the contrary, Bonnet (1866) opposed a view according to which the *Banque de France* guaranteed the exchange rate stability through the canal of the discount rate. Among contemporary authors of the mid 19th century, Bonnet was one of the few who did point out the relationship between the discount rate and the exchange rate: changes in the discount rate was presented as an instrument for stabilising currency. Bonnet (1866) questioned the "*substantial difference which did exist in 1866 between the discount rate of the British and the French central banks, difference that reached up to 5-6% and lasted for three months, the discount rate being at 4% in France against 10% in England… Many were astonished by such a spread that lasted without provoking in our country the export of all specie and emptying the cellar of the Banque de France. Far from that, the specie holdings continued to increase in France whereas it diminished in the Bank of England*" (p. 606). Why did this not harm France? "*The cause is the change contraire (the Sterling decrease) which hits England*" (p. 607). We have ahead of time, an astonishing and very interesting intuition of the rule that interest rate differential influences the exchange rate differential. His explanation of the phenomenon is as follows: there was such a distrust towards Sterling during this period that even such a huge spread was not sufficient to encourage capital inflows in Great-Britain. It seems judicious to understand, as Bonnet (1866), the low discount rate in France during this crisis as a mark of the solidarity of the *Banque de France* vis à vis the Bank of England. Reducing the spread would have increased the French specie holdings and simultaneously reduced specie holdings in England. This would have deepened the crisis, accelerated the capital flight out of England and finally worsened the distrust in the Sterling.

Bonnet (1866) wondered "*whether during periods of stability this financial solidarity that compelled the Banque de France and the Bank of England to follow each other, still existed and whether it was or not a preoccupation*" (p. 612). Once again, Bonnet (1866) revealed an amazing modernity: during a standard period, characterized by a lack of distrust towards one of the currencies, any discount rate differential ought to be considered as a mere yield difference, what motivated capital movements and constituted a threat for the domestic metallic holdings. To avoid this consequence, each central bank had to map its discount rate

on the other. The solidarity of discount rates was caused by the will to preserve the metallic holdings in order to respect the silver and gold par. To that respect, the best tool was the use of the discount rate. This supposed that the presumed follow-the-herd attitude of the *Banque de France* was just a form of co-ordination imposed in order to respect of the sacrosanct par: "*if we had remained indifferent, as some ones suggested, when our neighbours decided to raise their discount rate aiming at increasing their metallic stocks, our specie would have gone abroad much more rapidly. Because of the influence of the change contraire that already pushed them abroad, the effect of the discount rate differential would have been added … Thus, the solidarity between the two banks was actual and narrow, and the Banque de France was right to move its discount rate approximately up to the British level*" (p. 618).

Finally, this author sketched as follows the interactions between the exchange rate, the specie holdings and the discount rate: "*In some circumstances, one can leave things go without any problem. This situation is easy to recognize, it is revealed by the level of the exchange rate and the specie holdings of the bank. When the exchange rate is favourable the existing difference in the interest rate between two countries does not really matter*" (p. 622).

Juglar (1866) in his *Comptes rendus comparés de la Banque de France après les crises de 1839, 1847, 1857 et 1864* delivered an analysis close to Bonnet's (1866). His remarks on the influences of the exchange rate on central banks' metallic holdings were innovative: "*If you wish to derive the market solidarity from the difference in the interest rate, it is entirely wrong unless you take into account the exchange rate*" (p. 67).

Then, this author introduced a distinction between the cases of "favorable" exchange rate and "unfavorable" exchange rate; in the first case, "*let the exchange rate be favorable, whatever the difference in interest rate between the two places might be – although arbitrage might always be threatening – no drain of the metallic holdings is to fear. Let the exchange rate be unfavorable and a slight difference in the interest rates will rapidly empty the metallic holdings. It is because the Banque de France took this argument into consideration that it managed to maintain a 3% spread with the British discount rate without reducing its holding*" (pp. 67-68).

By that way, Juglar (1866) examined the conditions under which the discount rate differential influenced the exchange rate differential. Ahead of time, Juglar (1866) underlined that the sensitivity of capital movements to the discount rate differential depended on the status of the currency; should the exchange rate be favourable to the *franc*, a strong (negative) discount rate differential with England was needed to provoke capital exports from France because economic agents fear excepted returns to be balanced with a deeper loss in the Foreign depreciated currency (the Sterling pound); should it be unfavorable, a slight discount rate differential with England caused capital exports. Juglar met exactly Bonnet's analysis: on the peculiar episode of crisis he commented, the French bimetallic holdings did not deserve

an increase in the discount rate; did it occur, it would have accelerated the Sterling depreciation. Beyond this explanation of what actual solidarity between the two central banks was over the bimetallic period, Bonnet (1866) and Juglar (1866) put forward the role of the discount rate policy to prevent from exchange rate variations. These authors illustrated that co-operation between the *Banque de France* and the Bank of England was a pillar of the system because the discount rate differential between London and Paris caused and had a corrective influence on the spot Sterling-Franc exchange rate variations. By that way, Bonnet (1866) and Juglar (1866) can be considered, to some extent, as pioneers in the intuition of the IP relation.

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