Covered Arbitrage in Foreign Exchange Markets with Forward Forward Contracts in Interest Rates: Reply

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Comment on any work, published or unpublished, is always useful, and on that score I compliment Carl Batlin (1999) for his interesting observations on my work in this Journal (February, 1998). In my paper I have done three things: (i) redefined covered interest rate parity under a modified scenario, (ii) measured covered interest arbitrage profits, and (iii) highlighted iterative arbitrage and profit multiplier, first without and then with transaction costs. Batlin makes comments on the first point, and attempts to invalidate my modified expression of interest rate parity. His attempt is flawed for his confused and incorrect understanding of the Interest Rate Parity Theorem (IRPT). However, his work takes a fresh approach to the interest rate parity theorem within a stochastic framework, and he moves more toward speculation similar to what I have done in my piece (1997) than on covered arbitrage. To make my assertion clear, let me bring out the traditional version the interest rate parity here in the absence of transaction cost, which is consistent with Batlin's analytical structure.

Faced with the choices of investing at home and/or abroad with two *known* interest rates – (domestic rate, r, and foreign rate, r*), and *known*

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spot and forward rates of exchange (S and F, these being the prices of a foreign currency in terms of the home currency, \$/£), where r and r^* match the maturity of the forward contract, a rational investor remains indifferent as to where he should invest if:

$$r = \frac{F}{S}(1 + r^*) - 1 \tag{1}$$

whence:

$$\frac{F}{S} = \frac{1 + r}{1 + r^*} \text{ or } S(1 + r) = F(1 + r^*), \tag{1*}$$

which is the Eq. (1) of Batlin (where *his* ${}_0R_2/2$, ${}_0R^*{}_2/2$, S_0, and F_2 are *my* r, r^*, S, and F here in expressions (1) and (1*), respectively). Later on, however, his notations ${}_0R_2/2$, ${}_0R^*{}_2/2$, ${}_0R_1/4$, ${}_0R^*{}_1/4$, ${}_1Rf_2/4$, ${}_1R^{f*}{}_2/4$ are virtual equivalents[1] of *my* r_{02}, $r^*{}_{02}$, r_{01}, $r^*{}_{01}$, r_{12}, $r^*{}_{12}$. His F_2 later on is F_{02} in Eqs. (5) through (8) in my original paper. Here (1) or (1*) is the traditional version of the interest rate parity. Note, in the left-hand side of (1), r is the known domestic rate of interest which the investor can earn (or borrow at) without taking any risk, and the right-hand side is the rate of return for the investor if he exchanges his home currency (U.S. dollars) into foreign currency (British pounds) at the spot rate, puts the converted foreign currency amount into a fixed deposit at the interest rate, r^*, and sells the foreign currency amount with earned interest at the forward rate of exchange right now (at time 0). There is no risk-exposure; all the rates (interest rates and exchange rates) are known at the time the investor decides to invest at home or abroad, and as long as one choice is not superior or inferior to the other, it is a choice-neutral condition, known as covered interest parity or the Interest Rate Parity Theorem (see Ghosh, for example, 1991, 1994, 1997, 1998), and many others cited in my bibliography). There is nothing *unknown* or *expected* in this relation (1) or (1*). When the investor enters into any contract involving interest or exchange rates on a covered basis, he has no speculative role to play. Once this is fully understood, Batlin's comments fall flat, and so his analytical expressions merit no further response. One does not have to know what he terms "behavioral content." Once all the interest rates and exchange rates appear as *given* to the investor, he may find the situation of interest parity or its absence by his calculation. If the parity holds, then there is no scope for covered arbitrage, and if the parity is conspicuous by its absence, the arbitrageur jumps into the situation to exploit the market to make profits in the risk-free fashion. The question as to how these quotes, r_{12} and $r^*{}_{12}$, in my Eqs. (5) through (8) surface may be legitimately asked, and it should be a subject-matter for further discussion in terms of underlying economics. But that does not throw away my Eq. (6), as my expressions (3) and (4) in my original paper or Eqs. (1) and (1*) here, as Batlin will agree, cannot be dismissed. I may be in agreement with this commentator that his Eqs. (3a) and (3b) may explain my r_{12} and $r^*{}_{12}$, but to the investor these are *a priori* information. On this issue, I further like to note that since reality is not really the true pen picture of the idealized or stylized economic environment, r_{12} and $r^*{}_{12}$ may not at any point be derived as the unbiased predictors of future short term interest rates as Batlin notes in his Eqs. (3a) and (3b). Secondly, he should note that at any point of time, a real market observer finds a spectrum of interest rates with almost same maturity and underlying risk, and because probability assignment is not unique, expected value of future interest rate is not unique. Most importantly, one should recognize that an arbitrageur never enters into any financial contract (for covered arbitrage) unless he has known facts for the contractual agreement. If he does enter into any financial contract without known facts, he is not an arbitrageur on a covered position—he is a speculator. The Interest Rate Parity Theorem does not subsume the speculative scenario, although parity rate defines the speculative decision rules, as spelled out by this author elsewhere (1997c).

Finally, I would comment on the pure exsection hypothesis somehow drawn into this discussion by me, and now by the commentator. Let me bring out my original Eq. (6) once again as follows:

$$[(1 + r_{01})(1 + r_{12}) - (1 + r^*_{01})(1 + r^*_{12}) - (r_{02} - r^*_{02})]$$

$$= \left(\frac{F_{02} - S_0}{S_0}\right) [(1 + r^*_{01})(1 + r^*_{12}) - (1 + r^*_{02})]$$

Note my observation on that expression: "This is a new interest rate parity. If there is no roll-over with forward forward contracts on interest rates, the original interest rate parity, which is defined by

$$(r_{02} - r^*_{02}) = \left(\frac{F_{02} - S_0}{S_0}\right) (1 + r^*_{02})$$

is once again smoothly rehabilitated[3]. It should be noted that under pure expectations hypothesis on the term structure on interest rates (which holds in equilibrium) one can observe the following relations:

$$(1 + r_{01})(1 + r_{12}) = (1 + r_{02}),$$

$$\text{and } (1 + r^*_{01})(1 + r^*_{12}) = (1 + r^*_{02}),$$

and in that case then parity holds, and arbitrage profits do not arise." My footnote 3 (in my original paper) then established the claim I made. But if one drops pure expectations hypothesis, one can easily reestablish the same old claim that the original interest rate parity is once again smoothly rehabilitated. Note now that in the absence of rollover with forward forward contracts (that is, in the absence of a contract for the first three months, followed by another contract with three-to-six-month maturity on interest rates), one gets the following expressions:

$$(1 + r_{01})(1 + r_{12}) = 0, \tag{A}$$

$$(1 + r^*_{01})(1 + r^*_{12}) = 0. \tag{A*}$$

Now, if one substitutes (A) and (A*) into (6), the expression (7) immediately comes out. So pure expectation theory appears nonessential for my conclusion. At this point, I cite Grabbe's observations (1991, p. 266) once more: "It is tempting to equate the implied forward rate f(t + n, T − n) [that, is, in our example, r_{12}] with the expected short-term interest rate that will prevail at time t + n [that is, in our case, for 3-to-6 months from now]. The expectations theory should be considered a purely empirical proposition in the same way that the speculative efficiency hypothesis is a purely empirical proposition." Batlin should think through this observation, and examine my original paper along with all the cited pieces in the bibliography. His comments are, however, useful in further exposition of uncovered arbitrage and speculative decision rules, but not of value in the context of covered parity or arbitrage.

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