# Discussion

of

"The Swiss Franc Exchange Rate and Deviations from UIP: Global versus Domestic Factors" by Mathias Hoffmann and Rahel Suter

Tommaso Mancini Griffoli

My comments on the Hoffmann and Suter paper are divided in five parts. First, I give some theoretical background to the paper, as an aid to the reader, but also to build the intuition that Hoffmann and Suter mostly leave out. Second, I very briefly summarize some of the paper's key findings. Third, I bring up two econometric issues overlooked in the paper. Fourth, I take a critical look at the deeper implications of the paper's, and its corresponding literature's, model. This leads me to suggest an alternative and simpler explanation of the stylized facts alluded to in the paper. And fifth, I close with some minor points.

## 1. Intuition and Theory

The Hoffmann and Suter paper is built on a theoretical model first developed in Verdelhan (2010) and later expanded in Lustig and Verdelhan (2007). The thread in these works is that excess returns from carry trade portfolios across currencies can be explained by a version of the consumption-based capital asset pricing model (C-CAPM). Hoffmann and Suter regrettably leave it there, and go on to reproduce the related econometric methodology proposed in Lustig, Roussanov and Verdelhan (2009). The following section aims to bridge the gap in intuition and theoretical motivation left open by Hoffmann and Suter, without going into the details of the relatively intricate apparatus set up by the above papers (which I will call the Verdelhan et al. literature).

Suppose an agent is maximizing a basic utility function of the form

$$U = \mathbb{E}_t \left[ \sum_j^{\infty} \beta^j U(C_{t+j}) \right].$$

Suppose also that the agent can buy or sell an asset $i$ that costs $p_{i,t}$ and has a payoff $x_{i,t+1}$. The relevant Euler condition is

 

$$p_{i,t} = \mathbb{E}_t \left[ \beta \frac{U'(C_{t+1})}{U'(C_t)} x_{i,t+1} \right],$$

where the stochastic discount factor (SDF) or pricing kernel is defined as

$$M_{t+1} = \beta \frac{U'(C_{t+1})}{U'(C_t)}. \tag{1}$$

If return on assets is defined as

$$R_{i,t+1} = \frac{x_{i,t+1}}{p_{i,t}},$$

then

$$1 = \mathbb{E}_t[M_{t+1} R_{i,t+1}],$$

a condition which holds for any asset. It follows that the difference in return between two assets, $i = 1,2$, defined as $rx_{t+1} = R_{1,t+1} = R_{2,t+1}$, satisfies

$$0 = \mathbb{E}_t[M_{t+1} rx_{t+1}]. \tag{2}$$

In fact, when we speak of excess returns (above risk free returns), we have the above in mind.

Furthermore, recalling that $\mathbb{E}[AB] = \text{cov}(A,B) + \mathbb{E}[A]\mathbb{E}[B]$, it follows that

$$\mathbb{E}_t[rx_{t+1}]\mathbb{E}_t[M_{t+1}] = -\text{cov}(M_{t+1}, rx_{t+1}). \tag{3}$$

As seen from the perspective of carry trades, namely borrowing in a low interest rate or funding currency and investing in a high interest rate or target currency (sometimes also called uncovered interest parity (UIP) arbitrage), the above equation suggests that excess returns from carry trades are proportional to the negative covariance between excess returns and the SDF.

This naturally leads to a thought experiment. Note first that an increase in the stochastic discount factor is equivalent to a "bad shock": a situation in which future consumption, hit negatively by the shock, is valued more. Thus, if excess

returns from carry trades are pro-cyclical, in the sense that they decrease in bad times (or with an increase in the stochastic discount factor), then expected excess returns can be positive.

One of the biggest puzzles in international macro, often dubbed the exchange rate disconnect puzzle, is that the above does not hold. While carry trade returns are positive on average (see the literature following Fama, 1984, on tests of the UIP condition; for a survey, see Froot and Thaler, 1990), there is no series reasonably capturing the SDF which is correlated to excess returns, as argued in Burnside, Eichenbaum, Kleshchelski, and Rebelo (2008) and forcefully so in Burnside (2007a).

The literature recently re-kindled by Verdelhan et al. goes back to tackling this puzzle. It argues, as does the Hoffmann and Suter paper, that there are observable macro variables linked to the SDF that can explain excess returns from carry trades. Simplifying and borrowing from Burnside (2007b), these papers specify a linear factor model for the SDF of the stylized form,

$$\begin{aligned} M_{t+1} &= b'(f_{t+1} - \mu) \\ &= b'(g_{t+1}, c_{t+1}) \end{aligned} \tag{4}$$

where $\mu = \mathbb{E}_t[f_{t+1}]$ and $f_{t+1}$ is a vector of factors which can be further decomposed into global ( $g_{t+1}$) and domestic or idiosyncratic ($c_{t+1}$) factors. This implies that $\mathbb{E}_t[f_{t+1}] = -\text{cov}(M_{t+1}, rx_{t+1})$, suggesting the regression

$$rx_{t+1} = \alpha + \beta' f_{t+1} + \varepsilon_t, \tag{5}$$

where a negative and significant $\beta$ coefficient would solve the exchange rate disconnect puzzle. In a nutshell, Lustig, Roussanov and Verdelhan (2009) arrive at results in which that is indeed the case when the USD is the funding currency. Hoffmann and Suter suggest similar conclusions, albeit with some reservations, for the CHF.

But before discussing empirics, what is the intuition behind the above relations? First, recall that the SDF is a negative function of consumption growth or, it can be shown, of volatility. In turn, consumption volatility, is a positive function of a country's exposure to the global shock. Second, since interest rates are inversely related to the SDF (as can be shown by considering investment in a risk free bond with unit price), observation one suggests that low interest rate countries are more exposed to the global shock. Third, note that under complete markets the appreciation of a domestic currency against a foreign currency is a

positive function of the difference between the domestic and the foreign SDF (this can be shown by considering arbitrage between a foreign and a domestic investor buying a foreign bond).

With these observations in mind, consider, again, a thought experiment. Suppose a global shock hits a low and a high interest rate country. In both cases, the shock will lower future consumption. Yet, by observation two, the low interest rate country will suffer a greater consumption loss. By observation one, the SDF will grow more in the low interest rate country. And by observation three, that country's currency will appreciate against the high interest rate currency. And because carry trade strategies are short in the low interest rate currency and long in the high interest rate currency, returns will decrease. In the end, this series of causal links will have created the desired negative correlation between the SDF and excess returns from carry trades, thereby justifying the observed risk premium or positive excess returns, from carry trades.

## 2. Major Findings

These intricate relations suggesting the appreciation of funding currencies in "bad times" is what lies behind the Hoffmann and Suter approach, and what they call the safe haven properties of a currency. It is this property that they investigate for the Swiss franc. The paper does a good job of laying out results and explaining the methodology; I shall therefore refrain from summarizing these here. Generally, though, Hoffmann and Suter find that the safe haven properties of the Swiss franc are (i) currency specific (involving especially the USD, CAD and GBP as counterparts), and (ii) time varying, a condition which they attribute to interest rate differentials changing over time. On the whole, these findings are relatively different from Ranaldo and Soderlind (2010), one of the few other papers which stands out on the same topic, which finds strong evidence for a persistent safe haven status of the Swiss franc against a wider set of currencies. A more detailed discussion of the source of these differences would be appreciated in the Hoffmann and Suter paper.

## 3. Methodological Comments

The methodological part of the paper is rich and well documented. Yet, I find two specific procedures doubtful, the first leading to problems of identification and the second to endogeneity bias. To discuss these, I will again recast the paper's methodology in my own, simpler terms, following the earlier nomenclature. From equations (??) and (5), the main regression equation of the paper becomes

$$rx_{t+1}^{kh} = \alpha + \beta'(g_{t+1}(i^k - i^h), c_{t+1}^k, c_{t+1}^h) + \varepsilon_{t+1}, \tag{6}$$

where $(i^k - i^h)$ is added to underscore the dependence of the global shock on interest rate differentials, as discussed earlier, and where $k$ and $h$ denote the foreign and domestic countries respectively, where $k \in K$. In order to identify the global shock, Hoffmann and Suter suggest a procedure equivalent to averaging the above equation over all $k$, then taking the difference between two carry trade portfolios both of which are funded in the same home currency (the Swiss franc). The first step, argue Hoffmann and Suter, allows them to cancel the foreign country specific shocks, $c_{t+1}^k$, since

$$\lim_{\#K \to \infty} \frac{1}{\#K} \sum_{k \in K} c_{t+1}^k = 0,$$

where $\#K$ represents the number of countries in $K$.

This brings up my first doubt: with merely five foreign currencies as potential counterparts, the above is unlikely to hold. Note that Lustig, Roussanov and Verdelhan (2009) work with 34 currencies, an already slim cross section to satisfy the above simplification. Given this concern, it is unlikely that Hoffmann and Suter are able to identify the global shock with precision.

Identifying the home country specific shock, $c_{t+1}^h$, brings up another concern. Hoffmann and Suter argue that by taking a cross sectional average as above, both the foreign country specific shocks and the errors cancel to zero. Then, a regression of average excess returns on global shocks yields the home specific shock as its estimation error. That error can then be reintroduced in the above regression to estimate $\widehat{\beta}$. Yet, if $\varepsilon_{t+1}$ does not cancel in the first step due to an insufficiently large cross section, reintroducing the estimated country specific shocks in the above regression introduces an endogeneity bias, which Hoffmann and Suter should discuss, estimate and possible overcome.

## 4. Deeper Issues

Moving away from methodological details, the Hoffmann and Suter paper, along with the literature on which it is built, bring up some deeper issues. In particular, this class of models has three important implications; each can be traced back to the intuitions and theoretical underpinnings discussed above. First, low interest rate countries should have lower consumption growth (since these are the countries with the higher SDFs). Second, the currencies of these countries should be the ones appreciating over time, and especially so during "bad times". And third, interest rate differentials should vary with global shocks, or the impact of global shocks. To be more convincing, Hoffmann and Suter, or at least others in the literature, should test these implications rigorously.

Furthermore, an implication of the above applying specifically to Hoffmann and Suter is that, if anything, it should be real interest rate differentials between countries which capture differences between SDFs, as shown earlier. On this basis, the countries analyzed in the paper are all very similar; it becomes difficult to argue that one country should be more affected by global shocks than another. Hoffmann and Suter sustain that they use nominal interest rates in their analysis as they are interested in short term dynamics. Yet I find the argument unconvincing as, according to theory, it is not a short term change in a country's SDF which makes it react more to a global shock, but it is its state as a low interest rate, or high SDF, country which makes it more sensitive to global shocks at any given time.

There are, I would argue, simpler terms in which to recast the Verdelhan et al. story, and still go some way in explaining positive returns from carry trade arbitrage. These find root in Brunnermeier, Nagel and Pederson (2008) (henceforth BNP; see Burnside, 2008, for a synthetic summary of the intuitions therein). In BNP, interest rate differentials between countries are shown to favor more (i) carry trade speculation and (ii) expected skewness in returns. Thus, interest rate differentials are not a proxy for risk, as in the Verdelhan et al. literature in which they merely represent how countries are likely to react to global shocks. In BNP, interest rate differentials are rather the source of risk: the greater the differential, the greater are expected returns from carry trades and thus the incentive to speculate, although the more risk builds up of a sudden reversal, stemming from the funding currency appreciating. The BNP story is much closer to a more classical bubble story than an intricate optimal consumption story.

BNP also show that speculation and expected returns from carry trades decrease with higher volatility and lower liquidity. This suggests a possible alternative

explanation for the exchange rate disconnect puzzle. Could an increase in volatility and, perhaps especially, a decrease in liquidity induce a rise – perhaps spectacular – in the SDF during "bad times"? Although carry trade losses are not necessarily large in bad times, they could be valued highly as the SDF grows disproportionately. As the 2007–2009 financial crisis has shown, losses in times when liquidity is scarce can be especially harmful.

## 5. Minor Issues

Finally, some minor points are worth mentioning. Hoffmann and Suter's empirical analysis could gain from exploring the sensitivity of results to sub-samples, according to periods of high and low volatility, for instance. Likewise, a time-varying estimation of $\beta$ could reveal periods of stronger dependence on global shocks, as well as possible non-linearities in these relations. Also, expanding the set of currencies under study would favor a more robust estimation. Including more high interest rate currencies such as the AUD or NZD would be particularly helpful. And finally, higher frequency data should be available for the variables of interest and would seem to fit the dynamics of carry trade returns much better than the monthly data used in the paper.

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