



Predictability and ‘good deals’ in currency markets



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ABSTRACT

In this paper, we study predictability in currency markets over the period 1972–2012. To assess the economic significance of this predictability, we construct an upper bound on the explanatory power of predictive regressions of currency returns. The bound is motivated by “no good-deal” restrictions that, in efficient markets, rule out unduly attractive investment opportunities. We find that currency predictability exceeds this bound during recurring albeit short-lived episodes. Excess-predictability is highest in the 1970s and tends to decrease over time, but is still present in the final part of the sample period. Moreover, periods of high and low predictability tend to alternate. These stylized facts pose a challenge to Fama’s (1970) Efficient Market Hypothesis but are consistent with Lo’s (2004) Adaptive Market Hypothesis, coupled with a slow convergence towards efficient markets. Transaction costs can explain much of the daily excess-predictability, but not the monthly excess-predictability.

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1. Introduction

In a body of literature spanning more than thirty years, various studies have reported that filter rules, moving average crossover rules, and other technical trading rules often result in statistically significant trading profits in currency markets. Beginning with Dooley and Shafer (1976, 1984) and continuing with Chang and Osler (1999), Gencay (1999), LeBaron (1999), Levich and Thomas (1993), Neely, Weller, and Dittmar (1997), Schulmeister (2006) and Sweeney (1986), among others, this evidence casts doubts on the simple efficient market hypothesis, even though it is not incompatible with efficient markets under time-varying risk premia and predictability induced

by time-varying expected returns. More recently, however, and contrary to the bulk of these earlier findings, a number of authors, including Olson (2004) and Pukthuanthong, Levich, and Thomas (2007), have found evidence of a diminishing profitability of currency trading rules over time. In a comprehensive re-evaluation of the evidence, Neely, Weller, and Ulrich (2009) also conclude in favour of the declining profitability of technical trading rules. Menkhoff, Sarno, Schmeling, and Schimpf (2012) report a significant profitability of momentum strategies, but find that, in foreign exchange markets, successful momentum portfolios are skewed significantly towards minor currencies, with relatively high transaction costs and high idiosyncratic and country risk levels.

Based on the more recent studies, it is tempting to conclude that the foreign exchange market, or at least the more liquid portion thereof, where the main currencies are traded, has become increasingly efficient. However, this conclusion rests on the implicit assumption that the trading rules examined by these studies span all of the

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strategies that currency market participants could have deployed in order to earn excess-profits. Because, as was also noted by Griffin, Kelly, and Nardari (2010), econometricians necessarily work with only a subset of the information available to traders, and hence, at best, can identify only a subset of possible trading strategies, findings in support of efficiency based on this methodology may be suspect. The econometrician might end up formulating inferences on market efficiency by evaluating the performances of the wrong strategies, thus losing power against the null of market efficiency, as is demonstrated more formally in Appendix A.² This danger is compounded by the possibility that the market misprices different aspects of the multi-period distribution of asset returns at different points in time, with the consequence that, in order to exploit predictability, different strategies might be required at different times, thus making it difficult for an imperfectly rational (i.e., not endowed with RE) econometrician to identify the set of appropriate strategies.

In this paper, we overcome this inherent shortcoming of prior studies by focussing, not on the profitability of specific trading strategies, but on the predictability picked up by predictive models that have been chosen to provide a flexible yet parsimonious reduced form representation of the data generating process (henceforth, DGP) of currency returns, so as to capture as much of their predictability as possible. Importantly, we estimate the predictive models by Maximum Likelihood (ML), thereby imposing the null of rational expectations (RE), as defined by Muth (1961). We then make inferences on currency market efficiency by imposing an economically-motivated restriction directly on a natural measure of predictability, namely the coefficient of determination of the estimated predictive models. The advantage of this approach is that, rather than being based on specific trading strategies that are selected from sets of trading rules that might not contain the ones that rational currency traders would deploy, it is based on estimates of the DGP of currency returns that, because of the well-known link between ML and RE, e.g., Sargent (1979), mimic those that would be generated by currency traders endowed with RE.

The restriction we test is derived by ruling out, under the null and from the point of view of an investor endowed with RE, the availability of “good deals”. Following the terminology introduced by Cerný and Hodges (2001), Cochrane (2005) and Cochrane and Saà-Requejo (2000), “good deals” are defined as investment opportunities that offer unduly high Sharpe ratios. As was shown by Potì and Siddique (2013), the Sharpe ratio (henceforth, SR) is a popular measure of investment performance in foreign exchange markets because currency traders seek rewards for

the total risk rather than for the systematic risk only, due to their imperfect access to risk capital and economies of scale in currency trading. In this context, ruling out good deals, and therefore high SRs, is consistent with the implications of the efficient market hypothesis (henceforth, EMH) originally formulated by Fama (1970).

We base our inferences mainly, though not exclusively, on in-sample predictability. However, this is not a limitation of our analysis. On the contrary, as long as in-sample moments provide consistent estimates of ‘population’ moments, it allows specific implications of RE, in our case the no good-deal restriction, and therefore of the EMH, to be checked.³ As was demonstrated by Inoue and Kilian (2004), in-sample tests have a greater power against the null of no-predictability than out-of-sample ones, for a given size of the test, especially in the presence of un-modelled changing collinearity between predictive variables. Moreover, in-sample tests lend themselves more naturally to the use, as predictive models, of reduced form representations of the DGP, which helps researchers circumvent the noted limitation of many market efficiency tests, namely the fact that, even ex post, econometricians typically observe only a subset of the information set available to professional market participants. Also, as we shall demonstrate later, and as may be against widespread beliefs, there is a tight empirical link between in-sample and out-of-sample predictability, and therefore the former is a good instrument for the latter.

The empirical results in our study offer evidence of excess-predictability, consisting of statistically significant violations of the predictability upper bound. While such violations are especially severe in the initial and middle parts of our sample period, excess-predictability of currency returns has been around ever since the mid-1990s. Thus, our results are in contrast to the vanishing profitability of many popular technical trading rules reported in several recent studies referenced earlier. Importantly, we find that predictability varies over time in a roughly cyclical manner, with recurring albeit relatively short-lived episodes during which it exceeds the no good-deal bound. While our

² The very success of a particular strategy may cause its eventual demise, when the mispricing it exploits is wiped out because the strategy becomes popular, without necessarily implying that all mispricing has been eliminated. This leaves open the possibility that other strategies might be equally profitable. Neely et al. (2009) offer evidence that this might be the case in the currency domain, in that relatively less well-known trading rules appear to remain profitable even as the profitability of the more traditional ones fades away. That is, there might be changing sources of predictability, and the econometrician might simply not be aware of the full set of strategies that rational currency traders may deploy over time for exploiting predictability.

³ A short-cut to understanding our approach can be obtained by drawing an analogy to studies of excess volatility in equity markets, where researchers compare the volatility of share returns (in-sample) to the volatility of dividends, earnings, and discount factors (also in-sample). Along the same lines, but in the context of currency markets, Brennan and Xia (2006) relate the volatility of exchange rates to the volatility of the economy pricing kernel, and ultimately, to the volatility of discount factors. As was noted by Cochrane (2005, p. 396), “‘excess volatility’ is exactly the same thing as return predictability”. In the same vein, our study of foreign exchange markets examines whether the in-sample predictability is too high relative to the admissible variability of discount factors. In this respect, our approach can be seen as building upon the intuition developed by Kirby (1998) in his seminal article on rational asset pricing and predictability. Kirby (1998) offers a formal analysis of the restrictions that rational asset pricing models place on the coefficient of determination of predictive regressions, as well as on the intercept and slope coefficients of such regressions, and uses in-sample moments to make inferences about whether specific asset pricing models can account for the observed in-sample predictability of CRSP stock deciles. Shiller (2014), in his Nobel Laureate Lecture, recently remarked that excess-volatility tests (which necessarily use and compare in-sample estimates of the volatility of prices and fundamentals) “may be more powerful than regression tests of the basic efficient markets notions against important alternatives”.

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