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The Forward Market in Emerging Currencies: Less Biased than in Major Currencies

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This working paper, without the appendices, is forthcoming in the *Journal of International Money and Finance*.

ABSTRACT

Many studies have replicated the finding that the forward rate is a biased predictor of the future change in the spot exchange rate. Usually the forward discount actually points in the wrong direction. But, at least until recently, those studies applied only to advanced economies and major currencies. We apply the same tests to a sample of 14 emerging market currencies. We find a smaller bias than for advanced country currencies. The coefficient is on average positive, i.e., the forward discount at least points in the right direction. It is never significantly less than zero. To us this suggests that a time-varying exchange risk premium may not be the explanation for traditional findings of bias. The reasoning is that emerging markets are probably riskier; yet we find that the bias in their forward rates is smaller. Emerging market currencies of advanced countries.

JEL classification: F31

Keywords:

forward discount, forward premium, bias, puzzle, emerging markets, uncovered interest parity, exchange risk premium, exchange rate

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Thirty years ago, researchers found the forward exchange rate to be a biased predictor of the future spot exchange rate. Worse, in a regression of the future change in the spot rate against the forward discount, the exchange rate was found on average to move in precisely the *opposite* direction from what was predicted.¹ This surprising finding has been replicated many times since, on many sets of data, and with many refinements. But virtually all the tests have been applied to major currencies and industrialized countries, not to currencies of developing countries. By now enough emerging market currencies are represented by forward markets that it is possible to apply the same tests to them.²

1. Introduction: Tests of Bias in the Forward Discount

Although many explanations have been given for the finding of bias in the forward market, they fall into two categories. The first category of explanations, to which an apparent majority of authors subscribe, maintains the assumption of rational expectations, and interpret the systematic component of the forward market's prediction errors as a risk premium. The second category attributes the systematic component of the

¹ The first tests included Rogoff (1977), Hansen and Hodrick (1980), and Frankel (1980); they included consideration of two problems of the error term distribution: moving average errors (from overlapping contracts) and non-normal distributions (from the "peso problem"). Tryon (1997) was the first to run the regression in the form of changes relative to the contemporaneous spot rate, and Fama (1984) made this specification famous. Useful surveys of the original literature include Hodrick (1987), Froot and Thaler (1990), Engel (1995) and Lewis (1995). More recent contributions to the literature include Bacchetta and van Wincoop (2005), Backus, Foresi and Telmer (2002), Breuer (2000), Verschoor and Wolff (2001), Lustig and Verdelhan (2005), Verdelhan (2006), Lustig, Roussanov and Verdelhan (2008), Burnside, Eichenbaum, and Rebelo (2007), Gospodinov (2009), and Farhi and Gabaix (2008), among others. ² Bansal and Dahlquist (2000) test whether the interest differential for developing countries is an unbiased forecast of future exchange rate changes. Similarly, Lee (2006) includes 16 countries in his study of uncovered interest parity. Flood and Rose (2002) find that the bias in the interest differential is less for crisis countries, while not significantly different between developed versus developing. But one cannot invoke covered interest parity, and thereby associate such findings with forward rate bias, in the same way one could for advanced countries. The reason is that many of these countries have capital controls, default

forward rate's prediction errors to expectation errors on the part of market participants that are themselves systematic, at least within the sample.³ Algebraically, the regression equation is:

$$\Delta s_{t+1} = \alpha + \beta f d_t + \varepsilon_{t+1}, \tag{1}$$

where Δs_{t+1} is expost future percentage depreciation, defined as $s_{t+1} - s_t$,

defined as $f_t - s_t$, $s_t \equiv \log$ of the spot exchange rate at time *t* (defined as domestic units per foreign), and $f_t \equiv \log$ of the forward exchange rate at time *t*.

 fd_t is the forward discount, of a maturity matching that of the expost depreciation,

The null hypothesis of unbiasedness is $\beta = I$. The null would imply that there is no systematic time-varying component to the prediction errors: $E_t \Delta s_{t+1} - fd_t = \alpha$. The null hypothesis is actually a joint hypothesis, comprising of two distinct conditions: rational expectations: $E_t \Delta s_{t+1} = \Delta s_t^e$, plus no time-varying risk premium: $rp_t \equiv E_t \Delta s_{t+1} - fd_t - \alpha = 0$, where $E_t \Delta s_{t+1}$ is the mathematical expectation (within-sample), and Δs_t^e is the expectation held by investors. ε_{t+1} is the error term, which would be equal to the forward market prediction error under the null hypothesis. But the null hypothesis is almost always rejected statistically, and often the finding is $\beta < 0$. The question then becomes whether the findings of bias are to be interpreted as a time-varying risk premium, or as systematic expectation errors.

risk, and interest rates that are not freely determined in the marketplace. More recently, Gilmore and Hayashi (2008) have analyzed the forward premium puzzle for emerging market currencies.

³ This phrasing is intended to be broad enough to include the peso problem, learning, and other sources of error patterns that appear statistically significant within the sample. The definition need not necessarily imply that market participants are irrational. Among those who fall into the category of attributing the findings of bias to expectational errors are Froot and Frankel (1989) and Campbell, Koedijk, Lothian, and Mahieu (2007).

The simple purpose of this paper is to test for bias in the forward markets in emerging market currencies, and to see how the bias compares to that for major currencies. One motivation is to shed some possible light on the two competing interpretations of bias. Intuitively, emerging market currencies are probably riskier to hold than major currencies; one might think that the risk premium would therefore be larger and more variable than for major currencies. At the same time, emerging market currencies are more prone to bouts of high inflation and other sources of medium-term trends, so that one might think it would be easier to forecast the direction of movement of the spot rate than is the case for major currencies, where the exchange rate is closer to a random walk.⁴ If the bias is greater for emerging market currencies, that would point toward the risk premium interpretation; if less, then the other interpretation. We hasten to add that this suggested motivation is not demonstrated on the basis of formal theory. It would be hard to do so. It would not be easy, for example, to rule out the possibility that even though emerging market currencies have higher variance, their risk is highly diversifiable so that the risk premium could in theory go the other way.⁵ However, there is a bit of evidence, from survey data, that investors indeed find it easier to forecast the direction of movement of emerging market currencies than of major currencies.⁶

In the financial markets, efforts to exploit the forward discount bias generally go under different-sounding names. Exploiting the bias means "going long" in the currency that sells at a forward discount, relative to others. By covered interest parity, this is the same thing as going long in the currency that pays a higher short-term nominal interest

⁴ Huisman, Koedijk, Kool, and Nissen (1998) find less bias in periods when the forward discount or premium is large. Similarly, Lothian and Wu (2005) find that large interest rate differentials have significantly stronger forecasting powers for currency movements than small interest rate differentials.

⁵ Poonawala (2004).

rate, relative to others. Among European currencies in the early 1990s – with Italian interest rates, for example, above German interest rates – this strategy was known as the *convergence play.* The convergence play again became relevant in the 2000s for Central European currencies hoping to join the euro.⁷ In the mid-1990s, with Japanese interest rates very low, the strategy of borrowing in yen and going long in other currencies – especially dollar-linked currencies in Asia – was known as the yen carry trade. During the years 2001–2006, with US interest rates very low, the strategy of borrowing in dollars and going long in euros or emerging market currencies has been known as the *dollar carry trade.* One striking pattern about these episodes is that there are long intervals during which one would have happily made money on average with these strategies, but that these intervals were dramatically punctuated (though not fully reversed) by crises, in 1992 in Western Europe, 1997–98 in East Asia, and 2008 in Central Europe, Iceland, and elsewhere.⁸ Again, all these strategies are equivalent to attempts to exploit the finding of forward discount bias, which constitutes another motivation for testing to see whether the finding extends equally to emerging market currencies.

The paper examines forward markets for 35 currencies, classified under the two broad groupings of emerging market currencies versus the currencies of advanced economies countries (including the 11 original European Monetary Union countries).

Our results show that the bias in the forward discount for emerging market economies is smaller than for advanced economies. While we reproduce the standard

⁶ Chinn and Frankel (1994, 2002).

⁷ Residents of Hungary and Poland went short in euros and Swiss francs

⁸ Brunermiester, Nagel and Pedersen (2008) document the sudden unwinding of carry trades in crashes. Farhi, Fraiberger, Gabaix, Ranciere, and Verdelhan (2009) find that crash risk premia account for about ¹/₄ of average carry trade returns in advanced countries. Frankel (2008) offers a view of the carry trade for non-specialists.

finding that the coefficient is substantially less than zero for industrialized economies, and generally highly significant statistically, we find that the coefficient is much closer to zero for emerging market currencies: often positive and seldom significantly less than zero. To us the fact that the bias is stronger for advanced country currencies, which are presumably more stable, suggests that it may not be entirely due to an exchange risk premium.

2. The Data Sample

Although many national money markets have been liberalized since the 1970s, there is still only a relatively limited set of currencies in which forward exchange contracts are actively traded by international investors. Thus Asia is more heavily represented in our sample than Latin America or, certainly, Africa. Countries in our analysis have been classified as emerging market economies based on the IMF Country Grouping Classification.⁹ These also include some countries that are classified by the IMF as newly industrialized economies: Hong Kong, Singapore and Taiwan.

Our regression analysis proceeds first country by country, and then pooled. We start on December 31, 1996, because data are not available for enough emerging markets before then. In order to understand the impact of the Asian Financial Crisis of the late 1990s, two sets of regressions have been conducted: one includes the period of financial crisis, while the other does not. The results from the regression analysis starting December 1996 onwards are presented in Section three. Regression results for post Asian financial crises (from December 1998 onwards) are reported in Appendix V of the

⁹ See Appendix I for more details on data set. Appendices are available in Poonawala (2004).

working paper. We use Seemingly Unrelated Regressions (SUR) to correct for the likely correlation of the error term across currencies.

We have 14 currencies classified as emerging.¹⁰ (Dates and graphs of exchange rates over time are available in Appendices I, II, III and IV of the working paper.) Some countries with tightly fixed exchange rates were not included in the analysis. Hong Kong has been included, even though it has a currency board, because there is a small band which allows some room for movement. Leaving out specifically all those emerging market currencies that had stable currencies might bias the sample in favor of volatile emerging market currencies. Recent literature has emphasized the difficulty in establishing whether a declared flexible exchange rate regime is in fact just *de jure* or also *de facto*. Countries with capital controls (India) are not excluded from our sample. An established forward market in these countries shows that there exists a demand for forward exchange transactions.

As has long been recognized in this literature, the use of overlapping contracts (3month forward contracts observed at a one-month frequency) creates a moving average error process. We address this problem in the simplest way possible: by using nonoverlapping contracts. Our data are sampled at the same frequency as the horizon of the forward exchange rate – one month. It is necessary to avoid 'mismatching' which would involve incorrect pairing of the forward exchange rate and the future spot rate to which it

¹⁰ Indonesia, where the end-date of available forward exchange rate data does not coincide with the datasets available for other countries was included in individual country regressions, but was dropped from the pooled regression.

pertains. Specifically, we use the forward and spot exchange rates from the last working day of each month.¹¹ (Raw data are reported in Appendix VI of the working paper.)

3. Results Country by Country

We begin with the country by country regression results, presented in Table 1. The scatter plots for each country are illustrated in Figures 1 and 2. To repeat the regression equation,

$$s_{t+l} - s_t = \alpha + \beta \left(f_t - s_t \right) + \varepsilon_{t+l}.$$
⁽²⁾

The coefficient estimates bounce around a lot. This is especially due to the inclusion of countries with capital controls or announced pegs. It is important to remember that the forward discount regression was always intended to be a test of the null hypothesis of unbiasedness, rather than estimation of any alternative-hypothesis structural equation, so that stable coefficients are not to be expected.

The results confirm the usual finding of a strong forward rate bias for most of the industrialized country currencies. All the currencies except for the Greek drachma and Japanese yen show coefficients that are statistically less than one at very high significance levels. Most of the advanced countries show coefficients that are also significantly less than zero at the 5% level. Only Canada, Greece, Italy, Japan and the UK are not significant at the 5% level. Thus we can reject the hypotheses that the coefficient β is zero for sixteen of the twenty-one advanced economies, and we can also

¹¹ Breuer and Wohar (1996) identify timing pitfalls, and suggest that they can be reduced by taking data from the middle of the month instead of the end.

reject the hypotheses that $\beta=1$ for nineteen of the twenty-one countries in our advanced country sample.

[INSERT TABLES 1, 2 and 3 here] [INSERT Figures 1 and 2 here]

Our key result first appears in Table 2: the emerging market economies have coefficients that are generally less negative than their developed country counterparts. More are greater than zero than negative. The average coefficient for emerging market economies is also positive: 0.0033, versus -4.3331 for advanced economies. To be sure, the forward market is still a biased predictor for more than half of the emerging currencies: we can easily reject the hypothesis that the coefficient is 1.0 for eight of the fourteen emerging market economies (Hong Kong, India, Indonesia, Mexico, Saudi Arabia, South Africa, Taiwan and Turkey). But in none of the emerging market currencies is the coefficient statistically less than zero at the 5% significance level.

Thus far the results support a substantial difference between the results of the industrialized economies and the emerging markets. That the absolute values for emerging markets are smaller suggests that the forward exchange rate is a less biased indicator for the future expected spot rate in emerging market economies.¹²

Next, in Table 3, we correct for correlation of the error term across countries in the error term, using the technique of Seemingly Unrelated Regressions (SUR).¹³ The SUR analysis starts from October 1997, which is the starting point for India and Hungary

¹² Appendix 5 presents the regressions results for the data set not including the turbulent period covering the Asian Financial crisis.

¹³ Such a correlation is almost inevitable when using bilateral exchange rates. For example, a strong dollar or a contagious currency crisis in a particular month would likely show up across many of the bilateral dollar exchange rates.

in our dataset, so as to standardize the number of observation dates. Therefore all currencies have 78 data points.

Except for South Africa, and Canada and Japan, which appear as outliers in their sets – emerging market economies and advanced economies respectively – the emerging markets under SUR all continue to yield coefficient estimates that are less negative than all the industrialized economies. Among advanced currencies, 5 of 10 show coefficients that are clearly significantly less than zero, while among emerging markets only 2 of 14 do (Mexico and South Africa).

4. Results from Pooled Analysis

We next attempt, in Table 4, to capture more information from our data set by running a pooled country regression analysis with all currencies constrained to have the same coefficient within each class of countries. The pooled analysis lets us bring all the data to bear at once to get the best estimator. We keep separate pools for the emerging market economies and the industrialized economies. (See Figure 3.) To eliminate double counting of observations, only the Euro has been included in the pooled analysis for industrialized economies; individual EMU member countries have been excluded. This brings the number of advanced countries included in the pooled regression analysis from 21 to 10.

The β for the pooled analysis for emerging market currencies is -0.028. This estimate is significantly less than 1.0 at the 5% level. However we cannot reject the hypotheses that β =0. The coefficient for the pooled analysis for advanced economies is - 2.023 (shown in graph below). Again, while we can reject the hypothesis β =1 at the 5%

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level, and we can reject $\beta=0$ for the advanced economies, we cannot do so for the emerging markets. Increasing the '*n*' leads us to a sharper difference in the estimated β with a more negative value for the industrialized economies than for the emerging markets.

[INSERT TABLES 4, 5 and 5b Here]

[INSERT Figure 3 here]

We also run Seemingly Unrelated Regressions in the pooled regression analysis to address cross-currency correlation. (See Table 5) The pooled SUR analysis dropped observations for the last three countries, alphabetically (Taiwan, Thailand and Turkey), to make the number of emerging market observations equal the advanced countries (ten currencies for each).

A similar analysis of the simple (i.e., without SUR) Pooled Country analysis without Taiwan, Thailand and Turkey is reported in Table 5b, to allow comparison. The results are similar: the estimated coefficient is above zero, but insigificantly so. (Illustrated in Figure 4.)

[INSERT Figure 4 here]

5. Conclusions

The regression analysis conducted in this paper produces a striking result. While the bias in the forward discount as a predictor of the future change in the spot exchange rate is present among emerging market currencies and advanced country currencies alike, the bias is less severe in the former case than in the latter. Unlike major currencies, which generally show a coefficient significantly less than zero, suggesting that the

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forward rate actually points in the wrong direction, the coefficient for emerging market currencies is on average slightly *abov*e zero, and even when negative is rarely significantly less than zero. One implication for traders is that the "yen carry trade" and "dollar carry trade" on average may not be as profitable when the strategy is to go long in emerging market currencies as when it is to go long in major currencies. An implication for international finance theorists, in light of the intuitively high riskiness of emerging currencies, is that the source of forward discount bias does not lie entirely in the exchange risk premium.

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Appendix Table 4: Pooled Country Regressions (10/31/97 – 08/30/2004)

Appendix Table 5: Seemingly Unrelated Regressions I (Pooled Without Saudi Arabia, Turkey And Hong Kong)

Appendix Table 6: Seemingly Unrelated Regressions Ii (Pooled Without Taiwan, Thailand And Turkey)

[INSERT ALL 7 APPENDIX TABLES LISTED ABOVE HERE]

References

- Bacchetta, P., van Wincoop, E., 2005. Rational Inattention: A Solution to the Forward Discount Puzzle. NBER WP no. 11633.
- Backus, D., Foresi, S., Telmer, C., 2001. Affine Models of Currency Pricing: Implications for the Forward Premium Anomaly. Journal of Finance 56, 281–311.
- Bansal, R., Dahlquist, M., 2000. The Forward Premium Puzzle: Different Tales from Developed and Emerging Economies. Journal of International Economics, 51, 115–144.
- Breuer, J. B., 2000. Term Effects and Time-Varying Risk Premium in Tests of Forward Foreign Exchange Rate Unbiasedness. International Journal of Finance and Economics 5, 211–220.
- Breuer, J. B., Wohar, M.W., 1996. The Road Less Traveled: Institutional Aspects of Data and Their Influence on Empirical Estimates with an Application to Tests of Forward Rate Unbiasedness. The Economic Journal 106(434), 26–38.
- Brunnermeier, M., Nagel, S., Pedersen, L., 2008. Carry Trades and Currency Crashes. NBER WP no. 14473..
- Burnside, C., Eichenbaum, M., Rebelo, S., 2007. Understanding the Forward Premium Puzzle: A Microstructure Approach. NBER WP 13278.
- Campbell, R., Kees, K., Lothian, J., Mahieu, R., 2007. Irving Fisher, Expectational Errors, and the UIP Puzzle. Centre for Economic Policy Research Discussion Paper No. 6294.
- Chinn, M., Frankel, J., 1994. Patterns in Exchange Rate Forecasts for 25 Currencies. Journal of Money, Credit and Banking 26(24), 759-770.
- Chinn, M., Frankel, J., 2002. Survey Data on Exchange Rate Expectations: More Currencies, More Horizons, More Tests. In: Dickinson, D., Allen, W. (Eds.), Monetary Policy, Capital Flows and Financial Market Developments in the Era of Financial Globalisation: Essays in Honour of Max Fry, Routledge, London and New York.
- Engel, C. 1996. The Forward Discount Anomaly and the Risk Premium: A Survey of Recent Evidence. Journal of Empirical Finance 3, 123–192.
- Fama, E. F., 1984. Forward and Spot Exchange Rates. Journal of Monetary Economics, Volume 14, 319-338.
- Farhi, E., Fraiberger, S.P., Gabaix, X., Ranciere, R., Verdelhan, A., 2009. Crash Risk in Currency Markets. NBER Working Paper No. 15062.

Farhi, E., Gabaix, X., 2008. Rare Dissasters and Exchange Rates. NBER WP No. 13805.

- Flood, R., Rose, A. 2002. Uncovered Interest Parity in Crisis: The Interest Rate Defense in the 1990s. IMF Working Paper 01/207.
- Frankel, J., 1980. Tests of Rational Expectations in the Forward Exchange Rate Market Southern Economic Journal 46 (4), 1083–1101.
- Frankel, J., 2008. Carried Away: Everything You Wanted to Know About the Carry Trade. Milken Institute Review 10(1), 38–45.
- Froot, K., Frankel, J., 1989. Forward Discount Bias: Is it an Exchange Risk Premium?" Quarterly Journal of Economics 104(1), 139-161.
- Froot, K., Thaler, R. 1990. Anomalies: Foreign Exchange. Journal of Economic Perspectives 4(June), 179-192.
- Gilmore, S., Hayashi, F., 2008. Emerging Market Currency Excess Returns. NBER Working Paper No. 14528.
- Gospodinov, N., 2009. A New Look at the Forward Premium Puzzle. Journal of Financial Econometrics (Advance Access published online on February 24, 2009. Printed issue forthcoming).
- Hansen, L.P., Hodrick, R.J., 1980. Forward Exchange Rates as Optimal Predictors of Future Spot Rates: An Econometric Analysis. The Journal of Political Economy 88(5), 829-853.
- Hodrick, R., 1987. The Empirical Evidence on the Efficiency of Forward and Futures Foreign Exchange Markets. Taylor and Francis, New York.
- Huisman, R., Koedijk, K., Kool, C., Nissen, F., 1998. Extreme Support for Uncovered Interest Parity. Journal of International Money and Finance 17, 211-228.
- Lee, B. J., 2006. Uncovered Interest Parity Puzzle: Cross-sectional and Time-series Analysis. Unpublished Working Paper, University of Notre Dame.
- Lewis, K., 1995. Puzzles in International Financial Markets. In: Grossman, G., Rogoff, K. (Eds.), Handbook of International Economics, Vol. 3. North Holland.
- Lothian, J., Wu, L. 2005. Uncovered Interest-Rate pairty over the Past Two Centuries. Working Paper 8, Frank J. Petrili Center for Research in International Finance Working Paper series, Fordham University.
- Lustig, H., Roussanov, N., Verdelhan, A., 2008. Common Risk Factors in Currency Markets. NBER WP no. 14082.

- Lustig, H., Verdelhan, A., 2005. The Cross-Section of Currency Risk Premia and US Consumption Growth Risk. NBER WP 11104.
- Poonawala, J., 2004. Are Forward Exchange Rates Biased Indicators of Spot Exchange Rates in Emerging Market Economies? Second Year Policy Analysis paper, John. F. Kennedy School of Government, Harvard University.
- Rogoff, K., 1977. Rational Expectations in the Foreign Exchange Market Revisited. Unpublished paper, MIT (February).
- Tryon, R., 1979. Testing for Rational Expectations in Foreign Exchange Markets, International Finance Discussion Paper no. 139. Federal Reserve Board.
- Verdelhan, A., 2006. A Habit-Based Explanation of the Exchange Rate Risk Premium, Working paper presented at the NBER Summer Institute.
- Verschoor, W.F.C., Wolff, C.C.P., 2001. Scandinavian Forward Discount Bias Risk Premia. Economics Letters 73(1) October, 65-72.

Figure Legend

Figure 1: Spot on Forward Regression for Emerging Economies 12/1996 – 4/2003

Figure 2: Spot on Forward Regression for Industrialized Economies 12/1996 - 4/2003

Figure 3: Pooled Analysis (including 13 emerging market currencies)

Figure 4: Pooled Analysis (10 currencies in each category)



Figure 1: Spot on Forward Regression for Emerging Economies 12/1996 – 4/2003





Figure 2: Spot on Forward Regression for Industrialized Economies 12/1996 – 4/2003







Figure 3: Pooled Analysis (including 13 emerging market currencies)

Note: A reason for the bimodal distribution of data in the emerging market graph is the observations from Turkey, where a large depreciation occurred in early 2001. (Working Paper Appendices III and IV.)

Figure 4: Pooled Analysis (10 currencies in each category)



1		s _{t+1} - s _t	$t = \alpha + \alpha$	$-p(\mathbf{I}_t - \mathbf{S}_t)$	-Շ _{t+1}			
		Dates	N	$\boldsymbol{\beta}(S. E.)$	t: β=0	t: β=1	DW	F Prob
Advance	ed Economies							
1. A	Australia	12/96-4/04	88	-5.6437	-2.60	9.40	1.95	0.0108
				(2.1666)				
2. A	Austria	12/96-4/04	88	-5.2804	-2.70	10.32	1.75	0.0083
				(1.9551)				
3 F	Belgium	12/96-4/04	88	-5 5236	-2.81	11.03	1 75	0.0061
	8			(1.9642)				
4 (Canada	12/96-4/04	88	-3 2183	-1 70	4 97	1 96	0.0927
	Culludu	12/90 1/01	00	(1.8926)	1.70	1.57	1.20	0.0927
5 1	Denmark	12/96-4/04	88	-5 5150	_2 71	10.28	1 76	0.0080
5. 1	Dennark	12/90-4/04	00	(2.0319)	-2.71	10.20	1.70	0.0000
6 1	Furo	12/06 1/01	96	5 6024	2.60	10.06	1.01	0.0086
0. 1	Luio	12/90-4/04	80	(2.0813)	-2.09	10.00	1.01	0.0080
7 1	Finland	12/06 1/01	00	5 4690	207	11.50	1 70	0.0052
/. 1	rimana	12/90-4/04	00	-3.4080	-2.87	11.32	1./8	0.0032
0 1	P.	12/06 4/04	00	(1.9037)	2.65	10.04	1.74	0.0005
8. f	France	12/96-4/04	88	-5.1522	-2.65	10.04	1./4	0.0095
	a	10/06 4/04	0.0	(1.9419)	0.70	10.55	1.55	0.0076
9. (Germany	12/96-4/04	88	-5.2964	-2.73	10.55	1.75	0.0076
				(1.9384)				
10. 0	Greece	12/96-4/04	88	2.4052	1.18	0.48	1.77	0.2405
				(2.0348)				
11. I	Ireland	12/96-4/04	88	-5.6322	-2.61	9.42	1.77	0.0108
				(2.1612)				
12. I	Italy	12/96-4/04	88	-3.6422	-1.65	4.41	1.66	0.1032
				(2.2115)				
13. J	Japan	12/96-4/04	88	-1.2805	-0.63	1.24	2.14	0.5333
	•			(2.0472)				
14. N	Netherlands	12/96-4/04	88	-5.1816	-2.70	10.40	1.76	0.0083
				(1.9166)				
15. 1	New Zealand	12/96-4/04	88	-3.9942	-1.98	6.15	1.62	0.0506
				(2.0142)				
16 1	Norway	12/96-4/04	88	-3 8507	-2.63	10 98	2.18	0.0101
101 1		12/201/01	00	(1 4636)	2.00	10.90		0.0101
17 F	Portugal	12/96-4/04	88	-4 4242	-2.02	615	1.69	0.0462
17.1	lontugui	12/90 4/04	00	(2 1870)	2.02	0.15	1.07	0.0402
18 9	Snain	12/96-4/04	88	-4.8614	_2 21	7.08	1.68	0.0300
10. 0	Span	12/90-4/04	00	(2, 2027)	-2.21	7.08	1.00	0.0300
10 6	Swadan	12/06 1/01	00	(2.2027)	2.04	12.00	2.01	0.0021
19. 3	Sweden	12/90-4/04	00	-3.3293	-3.04	12.89	2.01	0.0031
20.0	0:41 1	12/06 4/04	00	(1.0104)	2.00	(()	1.07	0.0205
20. 8	Switzerland	12/96-4/04	88	-4.3037	-2.09	6.64	1.85	0.0395
		10/06 1/06	0.0	(2.0588)	1.00	2.02	0.10	0.1 (70
21. U	UK	12/96-4/04	88	-3.9999	-1.39	3.03	2.10	0.1673
				(2.8715)				

TABLE 1: Individual Advanced Country Regressions (12/31/96 – 04/30/04)Coefficients with Robust Standard Errors (Forecast Horizon is One Month) $s_{t+1} - s_t = \alpha + \beta (f_t - s_t) + \varepsilon_{t+1}$

	$\underline{s_{t+1} - s_t} = \alpha + \beta (f_t - s_t) + \varepsilon_t$										
		Dates	N	$\boldsymbol{\beta}(S. E.)$	t: β=0	t: β=1	DW	F Prob			
Emerg	ing and Newly In	dustrialized E	conor	nies							
1.	Czech Republic	12/96-4/04	88	0.4260	0.65	0.76	1.90	0.5206			
				(0.6604)							
2.	Hong Kong	12/96-4/04	88	-0.0439	-1.17	768	2.44	0.2468			
				(0.0376)							
3.	Hungary	10/97-4/04	78	0.7541	0.60	0.04	1.82	0.5511			
				(1.2594)							
4.	India	10/97-4/04	78	-0.6181	-0.72	3.53	1.43	0.4751			
				(0.8612)							
5.	Indonesia	12/96-12/02	73	0.1456	0.71	17.28	1.55	0.4807			
				(0.2055)							
6.	Kuwait	12/96-4/04	88	0.4050	0.43	0.40	1.89	0.6674			
				(0.9394)							
7.	Mexico	12/96-4/04	88	-0.6399	-1.57	16.16	1.99	0.1204			
				(0.4079)							
8.	Philippines	12/96-4/04	88	1.6770	0.98	0.16	1.87	0.3303			
				(1.7128)							
9.	Saudi Arabia	12/96-4/04	88	-0.0831	-1.00	168.17	2.94	0.3223			
				(0.0835)							
10.	Singapore	12/96-4/04	88	0.1911	0.15	0.39	1.86	0.8826			
				(1.2898)							
11.	South Africa	12/96-4/04	88	-3.2693	-1.78	5.38	1.74	0.0792			
				(1.8403)							
12.	Taiwan	12/96-4/04	88	0.1442	0.27	2.65	1.75	0.7842			
				(0.5252)							
13.	Thailand	12/96-4/04	88	0.9613	1.40	0.00	1.62	0.1643			
				(0.6853)							
14.	Turkey	12/96-4/04	88	-0.0031	-0.11	1241	1.54	0.9133			
				(0.0284)							

TABLE 2: Individual Emerging Market Country Regressions (12/31/96–04/30/04)Coefficients with Robust Standard Errors. Forecast Horizon is One Month.

Note on DW Stat: For the test of null hypotheses (no autocorrelation) at the 5% significance level, the appropriate dL and dU critical values for 80 to 99 observations and one explanatory variable are 1.61 and 1.66 respectively. I.e., we reject if d < 1.61 and do not reject if d > 1.66. For 60 to 79 observations, dL=1.55 and dU=1.62

TABLE 3: Se	em	ingly Unrela	ated Regressi	ions (Cou	ntry-wise) ¹⁴
		Coef.	Std. Err.	Z	P> z
Advanced Econom. Australia	ies	-1.24691	1.494352	-0.83	0.404
Canada	I	-0.010953	1.738178	-0.01	0.995
Denmark	I	-2.189826	0.623724	-3.51	0.000
European Union	I	-2.258394	0.624710	-3.62	0.000
Japan	I	1.032035	1.463353	0.71	0.481
New Zealand		-1.607774	1.337827	-1.20	0.229
Norway		-2.331581	0.768280	-3.03	0.002
Sweden	I	-2.190423	0.887877	-2.47	0.014
Switzerland	I	-1.998467	0.799680	-2.50	0.012
UK	I	-2.040146	1.755574	-1.16	0.245
Emerging and New	wlv	Industria	lized Econo	mies	
Czech Republic		-0.268865	0.625856	-0.43	0.667
Hong Kong	I	-0.025843	0.054466	-0.47	0.635
Hungary	I	-0.628215	0.642181	-0.98	0.328
India	I	-0.598888	0.542740	-1.10	0.270
Kuwait	I	0.897000	0.409053	2.19	0.028
Mexico	I	-0.863151	0.406361	-2.12	0.034
Philippines	I	-0.758016	0.701212	-1.08	0.280
Saudi Arabia	I	-0.070964	0.027124	-2.62	0.009
Singapore	I	0.174195	0.625553	0.28	0.781
South Africa	I	-1.638586	1.470407	-1.11	0.265
Taiwan	I	0.325223	0.410904	0.79	0.429
Thailand	I	-0.914912	0.465787	-1.96	0.050
Turkey		-0.028603	0.025821	-1.11	0.268

¹⁴ Does not include Euro member countries (to avoid overlap of data with the Euro) and Indonesia (end date of available forward exchange rate data does not coincide with the data-sets available for the remaining countries)

TABLE 3 (continued)
Dates for Seemingly Unrelated Regressions are from 10/31/1997 to 4/30/04

ausspot 78 1 .0319 0.0273 .696 0.404 canspot 78 1 .0185 0.0002 .00004 0.995 dnkspot 78 1 .0266 0.0460 12.326 0.000 euspot 78 1 .0265 0.5522 13.069 0.000	
canspot 78 1 .0185 0.0002 .00004 0.995 dnkspot 78 1 .0266 0.0460 12.326 0.000 euspot 78 1 .0265 0.0522 13.069 0.000	
dnkspot 78 1 .0266 0.0460 12.326 0.000 euspot 78 1 .0265 0.0522 13.069 0.000	
euspot 78 1 .0265 0.0522 13.069 0.000	
Jpnspot /8 I .0364 -0.00/4 .498 0.481	
nzlspot 78 1 .0328 0.0275 1.444 0.229	
norspot 78 1 .0273 0.0629 9.210 0.002	
swespot 78 1 .0269 0.0677 6.086 0.014	
sfrspot 78 1 .0271 0.0359 6.245 0.013	
ukspot 78 1 .0207 0.0243 1.350 0.245	
czespot 78 1 .0350 0.0004 .185 0.668	
hkspot 78 1 .0010 0.0009 .225 0.635	
hunspot 78 1 .0291 -0.0108 .957 0.328	
indspot 78 1 .0118 0.0111 1.218 0.270	
kwtspot 78 1 .0040 -0.0066 4.809 0.028	
mexspot 78 1 .0254 0.0186 4.512 0.034	
phlspot 78 1 .0309 -0.0018 1.169 0.280	
sauspot 78 1 .0001 0.0791 6.845 0.009	
sgpspot 78 1 .0187 0.0001 .078 0.781	
safspot 78 1 .0465 0.0296 1.242 0.265	
taispot 78 1 .0162 0.0005 .626 0.429	
thaspot 78 1 .0413 -0.0060 3.858 0.050	
turspot 78 1 .0580 -0.0049 1.227 0.268	

TABLE 4: Pooled Country Regressions (10/31/97 – 04/30/2004)											
Pooled Data	Dates	N	β	t: β=0	t: β=1	DW	FProb				
			(S. E.)	-	-						
Emerging	12/96-4/04	1014	-0.0278	-0.96	1252	1.68	0.3375				
Economies ¹⁵			(0.0290)								
Advanced	02/97-4/04	780	-2.0231	-3.73	31.04	1.89	0.0002				
Economies ¹⁶			(0.5426)								

 ¹⁵ Pooled Analysis of Emerging Economies does not include Indonesia. All dates are from 10/97 to 4/04.
 ¹⁶ Pooled Analysis does not include the Euro countries. All dates are from 10/97 to 4/04.

TABLE 5: Seemingly Unrelated Regressions (Pooled) 17											
			Coef.	Std. Err.	Z	₽> z					
			1	0.4500	0 50						
Advanced Econ	omies		-1.666	0.4503	-3.70	0.000					
Emerging Mark	et Eco	nomies	0.152	0.1896	0.80	0.422					
Equation	Obs	Parms	RMSE	"R-sq"	χ2	2 P					
advspot emergspot	780 780	1 1	.0281 .0255	0.0220	13.6 .64	79 0.0002 5 0.4219					

TABLE 5b: Pooled Country Regressions (10/31/97 – 04/30/04)											
Pooled Data	Dates	N	β	t: β=0	t: β=1	DW	FProb				
			(S. E.)	-	_						
Emerging	12/96-4/04	780	0.0377	0.15	15.60	1.84	0.8769				
Economies			(0.2436)								
Advanced	02/97-4/04	780	-2.0231	-3.73	31.04	1.89	0.0002				
Economies			(0.5426)								

¹⁷ Does not include Euro member countries (to avoid overlap of data with the Euro) and Indonesia (end date of available forward exchange rate data does not coincide with the data-sets available for the remaining countries)

$s_{t+1} - s_t - \alpha + p_1 (r_t - s_t) + p_2 (r_{t-12}) + s_{t+1}$										
	Dates	N	Cons	$\beta_1(S. E.)$	$\beta_2(S. E.)$	$t:\beta_1=0$	$t:\beta_1=1$	$t:\beta_2=0$	DW	F Prob
Advanced E	conomies		•		· ·					
Australia	12/96-8/04	92	.0078 .0154	-5.0505 3.2276	0382 .2723	-1.56	3.51	-0.14	1.93	0.0636
Austria	12/96-8/04	92	.0002 .0078	-5.6939 2.2212	0668 .1719	-2.56	9.08	-0.39	1.77	0.0243
Belgium	12/96-8/04	92	.0005 .0078	-5.9971 2.2411	0771 .1722	-2.68	9.75	-0.45	1.77	0.0182
Canada	12/96-8/04	92	0100 .0061	-1.1265 1.8561	.2068 .1256	-0.61	1.31	1.65	2.07	0.0971
Denmark	12/96-8/04	92	.0003 .0077	-5.7296 2.2601	0374 .1659	-2.54	8.87	-0.23	1.79	0.0253
Euro	02/97-8/04	90	0006 .0076	-5.9019 2.3102	0516 .1647	-2.55	8.93	-0.31	1.83	0.0263
Finland	12/96-8/04	92	.0003 .0078	-5.9072 2.1822	0733 .1728	-2.71	10.02	-0.42	1.80	0.0157
France	12/96-8/04	92	.0001 .0078	-5.5488 2.2090	0648 .1722	-2.51	8.79	-0.38	1.76	0.0277
Germany	12/96-8/04	92	.0003 .0078	-5.7332 2.2123	0716 .1726	-2.59	9.26	-0.42	1.77	0.0225
Greece	12/96-8/04	92	0091 .0074	1.9845 2.2711	.1195 .1821	0.87	0.19	0.66	1.82	0.2758
Ireland	12/96-8/04	92	.0023 .0074	-5.2773 2.1898	0720 .1510	-2.41	8.22	-0.48	1.82	0.0355
Italy	12/96-8/04	92	0048 .0075	-3.0997 2.2900	.1177 .1539	-1.35	3.20	0.77	1.72	0.1958
Japan	12/96-8/04	92	0052 .0073	9652 2.9164	.0319 .2608	-0.33	0.45	0.12	2.17	0.8150
Netherlands	12/96-8/04	92	.0002 .0078	-5.5973 2.1891	0689 .1732	-2.56	9.08	-0.40	1.77	0.0244
New	12/96-8/04	92	0061 .0131	-2.4812 2.4693	.2426 .2083	-1.00	1.99	1.16	1.73	0.0399
Zealand										
Norway	12/96-8/04	92	.0073 .0093	-3.9050 1.4392	0343 .1691	-2.71	11.62	-0.20	2.19	0.0291
Portugal	12/96-8/04	92	0031 .0075	-4.0050 2.3263	.0631 .1587	-1.72	4.63	0.40	1.73	0.1224
Spain	12/96-8/04	92	0021 .0076	-4.6061 2.3594	.0354 .1600	-1.95	5.65	0.22	1.72	0.0863
Sweden	12/96-8/04	92	.0031 .0084	-6.0388 1.9837	0757 .1703	-3.04	12.59	-0.44	2.03	0.0078
Switzerland	12/96-8/04	92	0065 .0077	-4.9364 2.1919	0984 .1678	-2.25	7.33	-0.59	1.88	0.0796
UK	12/96-8/04	92	.0025 .0097	-3.5541 3.0169	.0199 0.1440	-1.18	2.28	0.14	2.20	0.3576

Appendix Table 1: Individual Advanced Country Regressions (12/31/96 – 08/30/2004)

Coefficients with Robust Standard Errors (Forecast Horizon is One Month) $s_{t+1} - s_t = \alpha + \beta_1 (f_t - s_t) + \beta_2 (i_{t+1}) + \varepsilon_{t+1}$

Appendix Table 2: Individual Emerging Market Country Regressions (12/31/96–08/30/2004)

Coefficients with Robust Standard Errors. Forecast Horizon is One Month

$s_{t+1} = s_t - w_t + p_1(t_t - s_t) + p_2(t_{t-12}) + s_t$										
	Dates	N	Cons (S.E.)	β_1 (S. E.)	β_2 (S. E.)	$t:\beta_1=0$	t:β ₁ =1	t:β2=0	DW	F Prob
Emerging and Newly Industrialized Economies										
Czech										
Republic	12/96-8/04	92	0048 .0092	.3732 .6550	.0749 .1897	0.57	0.92	0.39	1.93	0.7540
Hong Kong	12/96-8/04	92	.0000 .0004	0464 .0331	.0015 .0079	-1.40	997	0.20	2.48	0.3740
Hungary	10/97-8/04	82	0123 .0135	.5228 1.2547	.2038 .1778	0.42	0.14	1.15	1.92	0.4601
India	10/97-8/04	82	0028 .0037	-2.1689 .9660	.2816 .0993	-2.25	10.76	2.83	1.84	0.0204
Indonesia	12/96-12/02	73	0351 .0644	.2479 .2873	.9435 1.3663	0.86	6.85	0.69	1.56	0.6890
Kuwait	12/96-8/04	92	0011 .0011	.3779 .8779	.0149 .0211	0.43	0.50	0.71	1.92	0.6724
Mexico	12/96-8/04	92	.0071 .0061	7570 .4548	.0988 .1512	-1.66	14.92	0.65	1.98	0.2524
Philippines	12/96-8/04	92	0063 .0081	1.5433 1.7736	.1143 .1138	0.87	0.09	1.00	1.88	0.2833
Saudi Arabia	12/96-8/04	92	.0000. 0000.	0829 .0832	.0001 .0004	-1.00	169	0.26	2.94	0.4736
Singapore	12/96-8/04	92	0032 .0033	.3746 1.3160	.1276 .0929	0.28	0.23	1.37	1.92	0.3520
South Africa	12/96-8/04	92	0097 .0217	-2.6554 1.7722	.7290 .3047	-1.50	4.25	2.39	2.00	0.0094
Taiwan	12/96-8/04	92	0053 .0029	3741 .5375	.1714 .0844	-0.70	6.53	2.03	1.76	0.1188
Thailand	12/96-8/04	92	0027 .0047	.8490 .6770	.1147 .1430	1.25	0.05	0.80	1.62	0.3528
Turkey	12/96-8/04	92	0210 .0140	.0258 .0288	1.095 .3012	0.89	1136	3.64	1.71	0.0021

 $s_{t+1} - s_t = \alpha + \beta_1 (f_t - s_t) + \beta_2 (i_{t+12}) + \varepsilon_t$

Note on DW Stat: For the test of null hypotheses (no autocorrelation) at the 5% significance level, the appropriate dL and dU critical values for 80 to 99 observations and one explanatory valuable are 1.61 and 1.66 respectively. I.e., we reject if d<1.61 and do not reject if d>1.66. For 60 to 79 observations, dL=1.55 and dU=1.62

Appendix Table 3a: Seemingly Unrelated Regressions (Country-wise – Advanced Economies)¹⁸

Advanced Economies

	Coef.	Std. Err.	Z	₽> z	[95% Conf.	Interval]
ausspot auslf ilevlyrlag _cons	6090974 .2595897 0109909	2.149171 .2350874 .0126026	-0.28 1.10 -0.87	0.777 0.269 0.383	-4.821395 2011732 0356916	3.6032 .7203526 .0137098
canspot canlf ilevlyrlag cons	2.217106 .3115863 015134	2.333359 .1286719 .0063072	0.95 2.42 -2.40	0.342 0.015 0.016	-2.356193 .059394 0274959	6.790405 .5637786 0027721
dnkspot dnklf ilevlyrlag cons	-1.837752 .1354066 0071554	.6422256 .1520151 .0073626	-2.86 0.89 -0.97	0.004 0.373 0.331	-3.096491 1625376 0215858	5790131 .4333508 .0072751
euspot eulf ilevlyrlag cons	-1.835098 .1408113 0076237	.6597306 .1517292 .0073282	-2.78 0.93 -1.04	0.005 0.353 0.298	-3.128146 1565724 0219866	5420498 .438195 .0067392
jpnspot jpnlf ilevlyrlag _cons	.4099371 .1195707 0051634	1.870401 .239772 .0100863	0.22 0.50 -0.51	0.827 0.618 0.609	-3.255982 3503738 0249322	4.075856 .5895152 .0146053
nzdspot nzdlf ilevlyrlag _cons	-1.743768 .2631562 009437	1.550389 .2078343 .0113061	-1.12 1.27 -0.83	0.261 0.205 0.404	-4.782474 1441915 0315966	1.294937 .670504 .0127225
norspot norlf ilevlyrlag _cons	-2.280175 .0369278 .0018782	.7763444 .1576541 .0078592	-2.94 0.23 0.24	0.003 0.815 0.811	-3.801782 2720686 0135257	7585682 .3459241 .017282
swespot swelf ilev1yrlag _cons	-1.992416 .1444558 0066412	1.051104 .1613433 .0077403	-1.90 0.90 -0.86	0.058 0.371 0.391	-4.052543 1717713 021812	.0677105 .4606829 .0085295
swfspot swflf ilevlyrlag cons	-2.43158 .0336786 0074463	.8510268 .1579499 .007548	-2.86 0.21 -0.99	0.004 0.831 0.324	-4.099561 2758975 0222402	7635976 .3432548 .0073476
ukspot uklf ilevlyrlag cons	-1.958035 .0920992 0026584	1.99615 .1351497 .0077863	-0.98 0.68 -0.34	0.327 0.496 0.733	-5.870417 1727894 0179194	1.954347 .3569878 .0126025

¹⁸ Seemingly Unrelated Regression (SUR) does not include Euro member countries (to avoid overlap of data with the Euro) and Indonesia (end date of available forward exchange rate data does not coincide with the data-sets available for the remaining countries)

Appendix Table 3b:

Seemingly Unrelated Regressions (Country-wise – Emerging Economies) Emerging and Newly Industrialized Economies

	Coef.	Std. Err.	Z	₽> z	[95% Conf.	Interval]
azaanat	1					
czespol	100047		0 1 0	0 070	1 272547	1 1 1 1 1 2 0
CZEII	1062047	.0400132	-0.16	0.870	-1.3/354/	1.101138
llevlyrlag	.0666965	.2041/84	0.33	0.744	3334859	.4668/88
	0055495 +	.0097957	-0.57	0.571	0247487	.0136496
hkspot						
hk1f	0251463	.0548767	-0.46	0.647	1327027	.0824101
ilev1yrlag	.0016835	.0058658	0.29	0.774	0098131	.0131802
_cons	.0000446	.0002801	0.16	0.874	0005044	.0005936
hunspot	+ 					
- hun1f	5206165	.6200487	-0.84	0.401	-1.73589	.6946567
ilev1vrlag	.2155056	.163519	1.32	0.188	1049858	.5359971
_cons	0051701	.0090067	-0.57	0.566	0228229	.0124828
indspot	+ 					
ind1f	-2.094624	.5462061	-3.83	0.000	-3.165168	-1.02408
ilev1vrlag	2774432	069823	3.97	0.000	1405926	4142937
cons		0030698	-0.94	0 348	- 0089	0031334
	+					
kwtspot						
kwt1f	.7145258	.3940511	1.81	0.070	0578001	1.486852
ilev1yrlag	.0175572	.0229027	0.77	0.443	0273313	.0624457
_cons	0015842	.0011512	-1.38	0.169	0038406	.0006721
mexspot	+					
mex1f	9546764	.4583512	-2.08	0.037	-1.853028	0563244
ilev1vrlag	.1016194	.1647853	0.62	0.537	2213537	.4245926
cons	.0083986	.0071179	1.18	0.238	0055522	.0223495
	+					
phpspot						
phplf	9409439	.6966108	-1.35	0.177	-2.306276	.4243882
ilev1yrlag	.1609941	.1780513	0.90	0.366	1879801	.5099683
_cons	.0040508	.008989	0.45	0.652	0135673	.0216689
sauspot	+					
saulf	, I0710727	0265758	-2.67	0.007	1231602	0189852
ilev1vrlag	-5 88e-06	0006387	-0.01	0 993	- 0012576	0012459
cons	.0000223	.0000321	0.70	0.486	0000405	.0000852
	+					
sgpspot	0017071	600145	0 1 5	0 005	1 1 4 7 1 0 4	1 220772
sgpli	.091/9/1	.632145	0.15	0.885	-1.14/184	1.330778
ilevlyrlag	.0836068	.1071506	0.78	0.435	1264046	.2936182
cons	0026112 +	.0051946	-0.50	0.615	0127924	.00757
safspot						
saflf	-1.604801	1.46348	-1.10	0.273	-4.473169	1.263568
ilev1yrlag	.7627199	.261873	2.91	0.004	.2494582	1.275982
_cons	018458	.0174532	-1.06	0.290	0526657	.0157497
taispot	+ 					
+=====================================	0106561	445279	-0 02	0 9.81	- 8833868	.8620747
ilowlyrlag	110728	0968/2	1 1 1	0.253	- 0790788	3005347
TTCVTYTTAY	- 0037850	0046034	-0 82	0.200	- 0128082	0052366
	+	.0040034	-0.02		0120002	.0052500
thaspot	I					
thalf	-1.133166	.4784788	-2.37	0.018	-2.070967	1953645
ilev1yrlag	.1399682	.2379905	0.59	0.556	3264847	.6064211
_cons	0032163	.0114265	-0.28	0.778	0256118	.0191792
turspot	+ 					
t.urlf	0000766	.0259992	-0.00	0.998	0510341	.050881
ilev1vrlag	.9717234	.3312556	2.93	0.003	.3224744	1.620972
cons	0178609	.01569	-1.14	0.255	0486128	.0128909

Equation	Obs	Parms	RMSE	"R-sq"	chi2	P
ausspot	82	2	.0311295	0.0370	2.876971	0.2373
canspot	82	2	.0178343	0.0448	6.252343	0.0439
dnkspot	82	2	.0259927	0.0496	9.975345	0.0068
euspot	82	2	.0259548	0.0545	9.738021	0.0077
jpnspot	82	2	.0354747	0.0016	.2500312	0.8825
nzdspot	82	2	.0318026	0.0554	5.188638	0.0747
norspot	82	2	.0270753	0.0610	8.869796	0.0119
swespot	82	2	.0264799	0.0721	6.20474	0.0449
swfspot	82	2	.0267093	0.0417	8.743628	0.0126
ukspot	82	2	.0204978	0.0311	2.607678	0.2715
czespot	82	2	.0344863	0.0015	.119561	0.9420
hkspot	82	2	.0009752	0.0017	.2439022	0.8852
hunspot	82	2	.0280756	0.0131	2.352753	0.3084
indspot	82	2	.0107387	0.1770	21.21513	0.0000
kwtspot	82	2	.0039233	0.0028	3.780866	0.1510
mexspot	82	2	.0248683	0.0170	4.51434	0.1046
phpspot	82	2	.0300656	0.0057	2.298681	0.3168
sauspot	82	2	.0001092	0.0795	7.181166	0.0276
sgpspot	82	2	.018267	0.0075	.6150835	0.7353
safspot	82	2	.0445779	0.1186	10.54344	0.0051
taispot	82	2	.0157674	0.0172	1.427172	0.4899
thaspot	82	2	.0403344	-0.0051	5.652978	0.0592
turspot	82	2	.0538321	0.1042	9.61522	0.0082

Dates for Seemingly Unrelated Regressions are from 10/31/1997 to 8/30/2004

Appendix Table 4: Pooled Country Regressions (10/31/97 – 08/30/2004)

Coefficients with Robust Standard Errors (Forecast Horizon is One Month)

$\mathbf{s}_{t+1} - \mathbf{s}_t = \alpha + \beta_1 \left(\mathbf{f}_t - \mathbf{s}_t \right) + \beta_2 \left(\mathbf{i}_t \right) + \varepsilon_{t+1}$										
	Dates	N	Cons	$\beta_1(S. E.)$	$\beta_2(S. E.)$	$t:\beta_1=0$	t:β ₁ =1	t:β ₂ =0	DW	F Prob
Pooled Data										
Emerging	12/96-8/04	1066	-0.0051	-0.0231	0.1871	-0.80	1257	4.16	1.71	0.0001
Economies ¹⁹			0.0020	0.0288	0.0449					
Advanced	12/96-8/04	820	-0.0066	-1.5035	0.1352	-2.73	20.70	2.65	1.95	0.0000
Economies ²⁰			0.0024	0.5502	0.0510					

¹⁹ Pooled Analysis of Emerging Economies does not include Indonesia (end date of available forward exchange rate data does not coincide with the data-sets available for the remaining countries). All dates are from 10/97 to 4/04. ²⁰ Pooled Analysis of Advanced Economies. does not include the Euro countries. All dates are from 10/97

to 4/04.

Appendix Table 5: Seemingly Unrelated Regressions I (Pooled without Saudi Arabia, Turkey and Hong Kong)

 Image: construction
 Coef.
 Std. Err.
 z
 P>|z|
 [95% Conf. Interval]

 Emerg1F |
 -.0228291
 .0133644
 -1.71
 0.088
 -.0490227
 .0033646

 ilevlyrlag |
 .1476253
 .0516335
 2.86
 0.004
 .0464254
 .2488251

 __cons |
 -.0029744
 .0025061
 -1.19
 0.235
 -.0078863
 .0019375

 Advspot

 Adv1F |
 -1.54993
 .4849217
 -3.20
 0.001
 -2.500359
 -.5995014

 ilevlyrlag |
 .1332615
 .0551209
 2.42
 0.016
 .0252266
 .2412965

 _cons |
 -.0065915
 .002649
 -2.49
 0.013
 -.0117836
 -.0013995

Dates for Seemingly Unrelated Regressions are from 10/31/1997 to 8/30/2004

Equation	Obs	Parms	RMSE	"R-sq"	chi2	P
Emergspot	820	2	.0278	0.0146	12.16366	0.0023
Advspot	820	2	.0275328	0.0294	25.80536	0.0000

Note: SUR analysis requires same number of observations for data under analysis. In this case emerging market economies were reduced from 1066 observations to 820 by dropping three countries. The countries dropped were: Saudi Arabia, Turkey and Hong Kong. These countries were chosen as they have fixed exchanges exchange rates/capital controls.

Appendix Table 6: Seemingly Unrelated Regressions II (Pooled without Taiwan, Thailand and Turkey)²¹

Dates for Seemingly Unrelated Regressions are from 10/31/1997 to 8/30/2004

	Coef.	Std	. Err.	 Z	₽> z	[95	% Conf.	Interval]
Emergspot Emerg1F ilev1yrlag cons	 0496556 .1566065 0052057	.20 .05 .00	59858 34172 25864	-0.24 2.93 -2.01	0.810 0.003 0.044	45 .05 01	33805 19107 02749	.3540692 .2613023 0001366
Advspot AdvlF ilevlyrlag 	 -1.216873 .1478042 0072434	.47 .05 .00	29104 49216 26407 	-2.57 2.69 -2.74	0.010 0.007 0.006	-2. 01	14376 04016 24191 	2899858 .2554485 0020677
 Equati	.on	Obs 1	Parms	RMSI	E "R-	·sq"	chi2	Р
Emergs Advspc	spot)t	820 820	2 2	.0284822	2 0.0 2 0.0	107 8 290 2	2.21049	0.0131

Note: SUR analysis requires same number of observations for data under analysis. In this case emerging market economies were reduced from 1066 observations to 820 arbitrarily by dropping three countries. The countries dropped were: Taiwan, Thailand and Turkey, the last three countries listed alphabetically.

²¹ Does not include Indonesia (end date of available forward exchange rate data does not coincide with the data-sets available for the remaining countries).