Separate Appendix to 'Common Risk Factors in Currency Markets'

This Appendix reports additional robustness checks. We first report in Appendix A asset pricing results obtained with the principal components of our currency portfolios. We then consider, in Appendix B, different samples of currency returns. We also report in Appendix C additional results obtained with volatility risk factors. Appendix D investigates the time-varying equity risk of currency excess returns. Section Appendix E focuses on momentum portfolios. Finally, we illustrate the dynamics of our calibrated model in Appendix F.

Appendix A Principal Components as Factors

Table 14 reports asset pricing results obtained with the first two principal components of our benchmark currency portfolios. Results are described in the main text.

[Table 14 about here.]

Appendix B Other Samples

We perform four robustness checks. First, we consider the sample proposed by Burnside, Eichenbaum, Kleshchelski and Rebelo (2008). Following the methodology of Lustig and Verdelhan (2007), Burnside et al. (2008) build 5 currency portfolios. Burnside et al. (2008) claim that these currency excess returns are not related to any risk factor. Using the same methodology as in the main text, we find that these currency excess returns are clearly explained by two risk factors. Second, we consider different home countries. We take the perspective of the Swiss, UK and Japanese investors, and for each investor, we build currency portfolios, test their business cycle properties and we estimate the corresponding market prices of risk. Third, we divide our main sample into two sub-samples, starting either in 1983 or in 1995. Fourth, we consider the longer sample of currency excess returns built using the Treasury bills that we studied in Lustig and Verdelhan (2007).

Appendix B1 Burnside et al (2006, 2008)

Countries Burnside et al. (2008) consider a sample of 21 developed countries: Australia, Austria, Belgium, Canada, Denmark, France, Germany, Ireland, Italy, Japan, the Netherlands, New Zealand, Norway, Portugal, South Africa, Spain, Sweden, Switzerland, the UK, the U.S. and the Euro. They find large currency excess returns and note that, 'while transaction costs are quantitatively important, they do not explain the profitability of the carry trade' (page 9). As a result, they abstract from transaction costs and work with spot and forward rates that are the average of bid and ask rates. Burnside et al. (2006) consider a smaller set of (at most) 10 developed countries: Belgium, Canada, Euro area, France, Germany, Italy, Japan, Netherlands, Switzerland, the United Kingdom and the United States. In comparison to the 10 countries in Burnside et al. (2006), we include Australia, Denmark, New Zealand, Norway, and Sweden in our sample of 15 developed countries. Note that this sample is too restrictive because it does not even encompass forward (or equivalent futures) contracts traded on large institutionalized currency markets as the Chicago Mercantile Exchange. Burnside et al. (2006) conclude that there are no large exploitable excess returns that result from the failure of UIP because the difference between the forward discount and the rate of depreciation is absorbed largely by bid-ask spreads.

Burnside et al. (2008) build 5 portfolios of currency excess returns following the methodology of Lustig and Verdelhan (2007). They conclude that risk factors do not explain the excess returns of these 5 portfolios. In this appendix, we build the same 5 portfolios and show that we obtain the same conclusion as with our two other samples: two simple risk factors reproduce the cross-section of excess returns, implying that these excess returns are compensations for risk.

Burnside et al. (2008) use spot and forward rates denominated in UK pounds, collected by Barclays and available on Datastream. We follow their assumption and convert these series into dollars using midquotes. The sample starts in 02/1976 and ends in 1/2008 as in Burnside et al. (2008). Table 15 below reports summary statistics on these 5 currency portfolios. The carry trade strategy that goes short the currencies in the first portfolio and long the currencies in the last portfolio offers an average log excess return of 6.47 percent per year and an average Sharpe ratio of 0.9. Burnside et al. (2008) report monthly excess returns (see their table 3 page 29). For example, their last portfolio offers a monthly excess return of 0.0082 for a standard deviation of 0.028. Annualized, these values imply a Sharpe ratio of 1.01. These values are certainly upper bounds on carry trade excess returns since they do not take into account any transaction costs.

[Table 15 about here.]

Cross-section of currency excess returns This cross-section of excess returns reflects different exposures to risk factors. In order to make this point, we build again two risk factors: the carry trade risk factor HML corresponds to the return on the fifth portfolio minus the return on the first portfolio, and the dollar risk factor RX is the average return across the test assets. Table 16 reports asset pricing results. The loadings on HML explain the cross-section of currency excess returns. The betas are highly significant. The first three portfolios have negative betas. The last two have positive betas. The loadings on the dollar factor RX do not vary across portfolios, as is to be expected. The alphas do not exceed 60 basis points per annum. They are not significantly different from zero on a case-by-case basis. We also cannot reject the null that the alphas are jointly zero. The market price of risk is highly significant; it is somehow higher than our own estimates because these excess returns do not take into account bid-ask spreads.

Figure 4 plots realized average excess returns on the vertical axis against predicted average excess returns on the horizontal axis. In order to draw this figure, we do not even estimate the market price of risk. We regress each actual excess return on a constant and the risk factors RX and HML to obtain the slope coefficient β^j. Each predicted excess returns is then obtained using the OLS estimate of β^j times the sample mean of the factors. It is obvious that these currency excess returns are risk premia.

As a final robustness check, we build portfolios based on each currency's exposure to aggregate currency risk as measured by HML. For each date t, we first regress each currency i log excess return rx^i on a constant and HML using a 36-month rolling window that ends in period $t-1$. This gives us currency i's exposure to HML, and we denote it $\beta_t^{i,HML}$. Note that it only uses information available at date t. We then sort currencies into five groups at time t based on these slope coefficients β_t^{HML}. Portfolio 1 contains currencies with the lowest βs. Portfolio 5 contains currencies with the highest βs. Table 17 reports summary statistics on these portfolios. The first panel reports average changes in exchange rates. The second panel shows that average forward discounts increase monotonically in these portfolios. As in our main sample, sorts based on forward discounts and sorts based on betas are clearly related, which implies that the forward discounts convey information about riskiness of individual currencies. The third panel reports the average log excess returns. They are monotonically increasing from the first to the last portfolio. Clearly, currencies that covary more with our risk factor - and are thus riskier - provide higher excess returns.

[Table 16 about here.]

[Figure 4 about here.]

[Table 17 about here.]

Appendix B2 Foreign Investors

We now adopt the perspective of foreign investors and we consider currency excess returns denominated in foreign currency. We report summary statistics on these excess returns, test their business cycle properties and we estimate the market prices of risk.

Summary Statistics We consider the case of a UK investor, a Japanese investor and a Swiss investor. These are three countries with large and well-developed currency markets. We compute the excess returns that local investors would obtain if they had access to forward contracts in their own currency. We obtained these excess returns by converting dollars into local currency at the midpoint rate. This way, investors are not hit twice by the bid-ask spread. Summary statistics on these currency excess returns are reported in Table 18.

[Table 18 about here.]

Cross-sectional Asset Pricing We now check the Euler equation of foreign investors in the UK, Japan and Switzerland. We construct the new asset pricing factors (HML and RX) in local currency and we use the local currency returns on our currency portfolios as test assets. Table 19 reports market prices of risk and cross-sectional measures of fit.

We construct the new asset pricing factors (HML_{FX} and RX) in local currencies, and we use the local currency returns as test assets. Note that HML_{FX} is essentially the same risk factor in all currencies, if we abstract from bid-ask spreads. Our initial spot and forward rates are quoted in US dollars. In order to convert these quotes in pounds, yen and Swiss francs, we use the corresponding midpoint quotes of these currencies against the US dollar.[8] The first panel in Table 19 reports results for the UK, the second panel for Japan and the third panel for Switzerland.

For all countries, the estimated market price of HML_{FX} risk is less than 70 basis points removed from the sample mean of the factor. The HML_{FX} risk price is estimated at 5.54 percent in the UK, 5.50 percent in Japan and 5.79 percent in Switzerland. These estimates are statistically different from zero in all three cases. The two currency factors explain between 47 and 71 percent of the variation (after adjusting for degrees of freedom). The mean squared pricing error is 95 basis points for the UK, 116 basis points for Japan and 81 basis points for Switzerland. The null that the underlying pricing errors are zero cannot be rejected except for Japan, for which the p-values are smaller than 10 percent.

[Table 19 about here.]

Appendix B3 Different Time Periods

We also check the robustness of our results by dividing our main sample over the 1983-2008 period in two sub-samples, spanning the 1983-1994 and 1995-2008 periods. Table 20 report summary statistics on our portfolios of developed and emerging countries. Sharpe ratios appear higher in the second sub-sample; currency excess returns have clearly not disappeared in the last ten years. We run asset pricing tests for both samples of developed, and developed and emerging countries. For each time sub-sample, we redo all the cross-sectional asset pricing tests. To save space, we report only results obtained on our large sample of countries in table 21. We find that the HML betas are very similar in both time sub-samples. In both cases, they range from -0.4 to 0.6 on

[8] Table 18 in the appendix reports summary statistics on these portfolios.

developed and emerging countries and from around -0.5 to 0.5 on developed countries. The market prices of risk differ across time periods; it is higher and more precisely estimated in the 1995-2008 period. The cross-sectional fit is also much higher in the second period. Because forward contracts were available only for a limited set of currencies, the first sub-sample uses, for example, at most 18 developed and emerging countries. The low number of countries and short sample clearly decreases the estimation power.

[Table 20 about here.]

[Table 21 about here.]

Appendix B4 Longer Sample of Treasury Bill-based Portfolios

Lustig and Verdelhan (2007) built eight portfolios of foreign T-bills sorted on interest rates, from a panel of 81 currencies. The data are annual, and the sample spans 1953-2002. We check whether the currency risk factors can explain the cross-sectional variation in excess returns on these foreign T-bills. HML is defined as the spread between the seventh and the first portfolio. Table 22 reports the results. The estimated risk price for HML varies between 4.10 percent on the whole sample and 6.20 percent on the post-Bretton-Woods subsample. This is very close to the estimate of 6.19 percent that we obtained on the basket of forward contracts. Also, these estimates are close to their respective sample means of 5.32 and 6.92 percentage points per annum. We also test whether the null that the αs are zero can be rejected. The results for both samples are reported in Table 23. The null cannot be rejected. Table 23 reports also all the portfolios βs on the two risk factors.

[Table 22 about here.]

[Table 23 about here.]

Using the HML we constructed from the longer time series, we can explore the business cycle properties of HML. We run a time series regression of HML on US non-durable consumption growth and on durable consumption growth. Over the 1953-2002 sample, the consumption β of HML is one; in the post-Bretton-Woods sample, it increases to 1.50. These estimates are statistically significant at the 5 percent level. The currency risk factor HML_{FX} is strongly pro-cyclical.

[Table 24 about here.]

Appendix C Volatility Risk Factors

Appendix C1 Volatility Risk Factor Using Daily Equity Returns

We describe in the main text the construction of this volatility factor. Tables 25 and 26 report the results of a horse race between HML_{FX} and the equity volatility factor. HML_{FX} drives out the volatility factor.

[Table 25 about here.]

[Table 26 about here.]

Appendix C2 Volatility Risk Factor Using Daily Currency Returns

We build a currency volatility factor along the same lines as our equity volatility factor. We start off daily changes in exchange rates and obtain monthly standard deviations of all exchange rate series in our sample. We compute the cross-sectional mean of these volatility series. We multiply the volatility factor by $\sqrt{252}$ in order to annualize it.

Table 27 reports asset pricing results using the currency volatility factor. Betas on this risk factor decrease monotonically from the first to the last portfolio (with one exception, the fourth portfolio in the large sample). Spreads in betas are large: they vary between 1.8 and -2.2 in the large sample, and between 1.8 and -1.6 in the second sample. High interest rate countries tend to offer low returns when exchange rate volatility is high. Low interest rate countries, on the contrary, offer high returns in such bad times. As a result, the market price of risk is negative and significantly different from zero.

[Table 27 about here.]

Appendix C3 Volatility Risk Factor Using Monthly Currency Returns

Finally, we compute the standard deviation of the past 12 month returns for each portfolio. Our volatility risk factor is the first difference of the average standard deviation across all portfolios. Table 28 reports the asset pricing results.

[Table 28 about here.]

Appendix D Time-Varying Equity Risk of the Carry Trade

We run the same asset pricing experiment on the cross-section of currency excess returns using the US stock market excess return as the pricing factor, instead of the slope risk factor HML_{FX}. To measure the return on the market, we use the CRSP value-weighted return on the NYSE, AMEX and NASDAQ markets in excess of the one-month average Fama risk-free rate. The US stock market excess return and the level factor RX can explain 52 percent of the variation in returns. However, the estimated price of US market risk is 37 percent, while the actual annualized excess return on the market is only 7.1 percent over this sample. The risk price is 5 times too large. The CAPM betas vary monotonically from -.05 for the first portfolio to .08 for the last one. Low interest rate currencies provide a hedge, while high interest rate currencies expose US investors to more stock market risk. These betas increase almost monotonically from low to high interest rates, but they are too small to explain these excess returns. Therefore, the cross-sectional regression of currency returns on market betas implies market price of risk that are far too high. The null that that the α's are zero is rejected at the 5 % significance level.[9]

Despite the low unconditional market beta of the carry trade, the carry risk factor HML_{FX} is very highly correlated with the stock market during periods of increased market volatility. The recent subprime mortgage crisis offers a good example. A typical currency carry trade at the start of July 2007 was to borrow in yen - a low interest rate currency - and invest in Australian and New Zealand dollars - high interest rate currencies. Over the course of the summer, each large drop in the S&P 500 was accompanied by a large appreciation of the yen of up to 1.7 percent in one day and a large depreciation of the New Zealand and Australian dollar of up to 2.3 percent in one day. Figure 5 plots the monthly returns on HML_FX at daily frequencies against the US stock market return. Clearly, a US investor who was long in these high interest rate currencies and short in low interest rate currencies, was heavily exposed to US aggregate stock market risk during the subprime mortgage crisis, and thus should have been compensated by a risk premium ex ante.

[Figure 5 about here.]

This pattern is consistent with the model. In the two-factor affine model, the conditional correlation of HML_{FX} and the SDF in the home country is:

$$corr_t\left(hml_{t+1}, m_{t+1}\right) = \frac{\sqrt{\delta z_t^w}}{\sqrt{\delta z_t^w} + \sqrt{\gamma z_t}}. \qquad \text{(Appendix D.1)}$$

As the global component of the conditional market price of risk increases, the conditional correlation between the stochastic discount factor at home and the carry trade returns HML_{FX} increases. We find strong evidence for this type of time-varying correlation in the data.

Following the intuition of the CAPM one might use the US stock market return as a proxy for the domestic SDF. We compute the correlation between one-month currency returns and the return on the value-weighted US stock market return using 12-month rolling windows on daily data. Figure

[9]Detailed results available upon request.

6 plots the difference between the correlation of the 6th and the 1st portfolio with the US stock market excess return. We denote it $Corr_\tau[R^m_t, rx^6_t] - Corr_\tau[R^m_t, rx^1_t]$, where $Corr_\tau$ is the sample correlation over the previous 12 months $[\tau - 12, \tau]$ and R^m, the stock market excess return. We also plot the stock market beta of HML_{FX}. These market correlations exhibit enormous variation. In times of crisis and during US recessions, the difference in market correlation between high and low currencies increases significantly. During the Mexican, Asian, Russian and Argentinean crises, the correlation difference jumps up by 50 to 90 basis points.

[Figure 6 about here.]

We now explore time-variation in market betas. There is evidence that, in times of financial crisis, the stock market beta of the high-minus-low strategy in currency markets increases dramatically. We start by examining the recent sub-prime mortgage crisis, and we then consider other crisis episodes. The last 4 columns of Table 29 reports the market betas of all the currency portfolios that we obtain on a 6-month window before 08/31/2007. To estimate the market betas, we use daily observations on monthly currency and stock market returns. The Newey-West standard error correction is computed with 20 lags. We estimate a market beta of HML_{FX} of up to 62 basis points. The estimated market betas increase monotonically as we move from low to high interest rate currency portfolios, as we would expect. We report the αs in the bottom panel of Table 29. Over this period, the estimated pricing errors α on the high-minus-low strategy dropped to 30 basis points over 6 months or 60 basis points per annum compared to an unconditional pricing error α_{HML} of more than 500 basis points per annum.

This is not an isolated event, as these results extend to other crises. In Table 29, we document similar increases in the US market beta of HML_{FX} during the LTCM crisis (column 1-4), the Mexican "Tequila" crisis (column 5-8) and the Brazilian/Argentine crisis (column 9-12). Again, the market betas increase monotonically in the forward discount rates. For example, $\beta^m_{\tau,HML}$ increases to 1.14 in the run-up to the Russian default in 1998, implying that high interest rate currencies depreciate on average by 1.14 percent relative to low interest rate currencies when the stock market goes down by one percent. Low interest rate currencies provide a hedge against market risk while high interest rate currencies expose US investors to more market risk in times of crisis. For the Tequila crisis, the market betas of all the currency portfolios are negative. This is consistent with our model, as the dollar risk premium component is counter-cyclical with respect to the US business cycle, and hence the expected returns on all portfolios can be negative (see equation 3.2). In two of these crisis, the α on the high-minus-low strategy is negative: minus 271 basis over the 6 months preceding the Russian default and minus 382 basis points during the Tequila crisis.[10] In the two other crisis, the αs are positive (96 and 29 basis points over 6 months

[10]These numbers need to be multiplied by 12 to be annualized.

respectively) but small, well below the average α of 4.46 percent per annum that we obtained over the entire sample. As we have shown, the market beta of the high-minus-low strategy increases dramatically in times when the price of global risk is high.

[Table 29 about here.]

Using the simulated return on the stock market portfolio we can show that the CAPM fails to explain currency return generated by our model, as in the data. In a sample of 5000 simulated periods, we run a time-series regression of HML_{FX} on the stock market return. We find that the CAPM α of HML_{FX} is large and statistically significantly different from zero: the CAPM understates the average return by over 3 percent (with very little statistical uncertainty given the large size of the simulated sample). This large CAPM α represents the bulk of the average HML_{FX} return. As a result, the CAPM cannot explain currency returns in this no-arbitrage model of exchange rates, even though the stock market wealth is priced using the same stochastic discount factor that prices currencies. The average stock market beta of the carry trade is somewhat higher than in the data, at about .6. This is in part because the model understates the stock market volatility.

Both the betas and the correlations of the currency portfolio returns with the stock market return exhibit a lot of variation over time, due to the fact that time-varying prices of risk imply time-varying conditional correlations of portfolio returns with the stochastic discount factor. Figure 9, in the separate appendix, plots the conditional betas and correlations of the carry factor returns with the stock market return (Panel A) as well as the realized volatility of the stock market return (Panels B), both computed using 12-month rolling windows, as used when estimation these quantities in the data. The periods of high global risk and, consequently, high stock market volatility correspond to a greater spread in correlations/betas of currency portfolios with the stock market return. Conditional market beta of HML_{FX} varies between close to zero in times of low volatility to well above one during episodes of spiking uncertainty. Thus, in our model the stock market risk of the carry trade varies over time in a manner consistent with the empirical evidence documented above.

Appendix E Momentum Portfolios

The upper panel in Table 30 lists the correlation matrix for these carry and momentum strategies in currency markets. Momentum and carry strategies are very different. In fact, the return correlations between corresponding (i.e. high/high or low/low) carry and momentum strategies are small and sometimes even negative. The lower panel reports the principal component analysis of these momentum and carry portfolios.

[Table 30 about here.]

Appendix F Model

Appendix F1 Inflation

We assume that inflation is composed of a country-specific component and a global component. Both components follow AR(1) processes:

$$\begin{aligned} \pi^w_{t+1} &= (1-\rho^w)\overline{\pi}^w + \rho^w \pi^w_t + \sigma^{w\$}\epsilon^w_{t+1}, \\ \pi^{ci}_{t+1} &= (1-\rho^i)\overline{\pi}^i + \rho^i \pi^i_t + \sigma^{i\$}\epsilon^i_{t+1}, \end{aligned}$$

where the innovations ϵ^w_t and ϵ^i_t are also $i.i.d$ gaussian, with zero mean and unit variance. Inflation in country i is a weighted average of these two components:

$$\pi^i_{t+1} = \mu^i \pi^{ci}_{t+1} + (1-\mu^i)\pi^w_{t+1}.$$

We define world inflation as the cross-sectional, unweighted average of all annual inflation rates, and we measure the moments of the average world inflation rate for the countries in our sample. The average global inflation is calibrated to be 3 percent annually, autocorrelation is equal to 0.87, and standard deviation is 2.1%. The relative weight μ on domestic versus world inflation set equal to 0.16; it is determined by the share of the total variance explained by the first principal component. We subtract the world component from each country inflation rate to obtain the autocorrelation and the shocks' standard deviation in each country. We use the average of these moments. This yields an average for the country-specific component equal to 3 percent, an autocorrelation of 0.5 and standard deviation equal to 10 percent, for the annualized series. Inflation moments are reported in panel III of table 5. We use monthly values corresponding to these annual quantities in calibrating the model parameters. Table 5 (panel IV) reports the calibrated parameters.

Figure 7 documents the statistical properties of the interest rates and exchange rates simulated from the model for a range of currencies.

[Figure 7 about here.]

Appendix F2 Stock Market Return

The ex-dividend price of the stock market portfolio at time t in the units of domestic currency is given by

$$P_t^i = E_t \sum_{s=1}^{\infty} D_{t+s}^i \exp\left[\sum_j^s m_{t+j}^i\right].$$

Since all the relevant information at time t is summarized by the state vector $[z_t^i, z_t^w]$, we can write the price-dividend ratio as

$$\frac{P_t^i}{D_t^i} = E\left\{\sum_{s=1}^{\infty} \exp\left[\sum_{j=1}^{s} \left(\Delta d_{t+j}^i + m_{t+j}^i\right)\right]\Bigg| z_t^i, z_t^w\right\}$$

We compute the price-dividend ratios that correspond to the simulated values of the state vector using Monte Carlo simulation and interpolate them using a kernel regression.

The stock market return is then calculated using the identity

We compute the stock market returns using

$$R_{t+1}^{Di} = \frac{P_{t+1}^i + D_{t+1}^i}{P_t^i} = \frac{P_{t+1}^i / D_{t+1}^i + 1}{P_t^i / D_t^i} \exp\left(\Delta d_{t+1}^i\right)$$

by simulating the dividend process jointly with the state variables and SDF innovations and using the kernel projection to interpolate the price-dividend ratios. In order to calculate the conditional correlations and betas of this return with the currency portfolio returns, as well as its conditional volatility, we consider 12-month rolling windows and estimate these moments in the same way as in the data.

Appendix F3 Time-Varying Equity Risk in the Model

Figure 8 shows that, in "bad times," when z^w is high, the spread between the average δ in the first and the last portfolio increases.

Figure 9 plots the conditional betas and correlations of the carry factor returns with the stock market return (Panel A) as well as the realized volatility of the stock market return (Panels B), both computed using 12-month rolling windows, as used when estimation these quantities in the data.

[Figure 8 about here.]

[Figure 9 about here.]

Table 14: Asset Pricing - US Investor - Principal Components

Panel I: Factor Prices and Loadings

	All Countries							Developed Countries						
	λ_c	λ_d	b_c	b_d	R^2	$RMSE$	χ^2	λ_2	λ_1	b_c	b_d	R^2	$RMSE$	χ^2
GMM_1	7.42	1.37	0.40	0.26	68.69	0.96		2.20	2.17	0.72	0.25	70.75	0.61	
	[3.12]	[1.65]	[0.17]	[0.31]			12.92	[1.22]	[2.02]	[0.40]	[0.23]			51.15
GMM_2	6.23	0.54	0.34	0.10	43.12	1.30		2.63	2.90	0.86	0.34	24.08	0.98	
	[2.86]	[1.60]	[0.15]	[0.30]			15.21	[1.17]	[1.94]	[0.38]	[0.23]			57.14
FMB	7.42	1.37	0.40	0.26	68.72	0.96		2.20	2.17	0.72	0.25	70.75	0.61	
	[2.52]	[1.35]	[0.14]	[0.25]			11.25	[1.02]	[1.72]	[0.33]	[0.20]			41.67
	[2.52]	[1.35]	[0.14]	[0.25]			12.37	[1.02]	[1.72]	[0.33]	[0.20]			42.64
$Mean$	**7.42**	**1.37**						**2.20**	**2.17**					

Panel II: Factor Betas

	All Countries						Developed Countries					
$Portfolio$	$\alpha_0^j(\%)$	β_c^j	β_d^j	$R^2(\%)$	$\chi^2(\alpha)$	$p-value$	$\alpha_0^j(\%)$	β_d^j	β_c^j	$R^2(\%)$	$\chi^2(\alpha)$	$p-value$
1	−0.99	−0.23	1.06	85.69			−0.21	−0.72	1.07	91.14		
	[0.72]	[0.02]	[0.04]				[0.64]	[0.05]	[0.02]			
2	−0.85	−0.14	0.96	81.38			−0.43	−0.38	1.04	85.94		
	[0.69]	[0.02]	[0.04]				[0.72]	[0.07]	[0.03]			
3	0.31	−0.14	0.94	76.89			1.15	−0.07	1.02	85.59		
	[0.84]	[0.02]	[0.04]				[0.81]	[0.07]	[0.03]			
4	1.72	−0.03	0.92	68.16			−0.54	0.44	0.94	85.14		
	[0.86]	[0.03]	[0.06]				[0.77]	[0.06]	[0.03]			
5	0.64	0.06	1.03	77.41			0.01	0.89	0.92	93.64		
	[0.80]	[0.03]	[0.04]				[0.49]	[0.04]	[0.02]			
6	−0.64	0.45	1.06	96.83								
	[0.34]	[0.01]	[0.02]									
All					6.90	0.33					2.40	0.79

Notes: The factors are the first and the second principal components (denoted d, for the "dollar" factor, and c, for the "carry" factor, respectively). The panel on the left reports results for all countries. The panel on the right reports results for the developed countries. Panel I reports results from GMM and Fama-McBeth asset pricing procedures. Market prices of risk λ, the adjusted R^2, the square-root of mean-squared errors $RMSE$ and the p-values of χ^2 tests on pricing errors are reported in percentage points. b denotes the vector of factor loadings. Excess returns used as test assets and risk factors take into account bid-ask spreads. All excess returns are multiplied by 12 (annualized). The standard errors in brackets are Newey and West (1987) standard errors computed with the optimal number of lags according to Andrews (1991). Shanken (1992)-corrected standard errors are reported in parentheses. We do not include a constant in the second step of the FMB procedure. Panel II reports OLS estimates of the factor betas. R^2s and p-values are reported in percentage points. The χ^2 test statistic $\alpha' V_\alpha^{-1} \alpha$ tests the null that all intercepts are jointly zero. This statistic is constructed from the Newey-West variance-covariance matrix (1 lag) for the system of equations (see Cochrane (2001), p. 234). Data are monthly, from Barclays and Reuters in Datastream. The sample period is 11/1983 - 03/2008. The alphas are annualized and in percentage points.

Table 15: US Investor - Portfolios of Countries in Burnside et alii (2008)

Portfolio	1	2	3	4	5
			Spot change: Δs^j		
Mean	-1.47	-1.19	-0.16	-0.34	2.23
Std	10.07	10.02	9.00	8.88	9.90
			Discount: $f^j - s^j$		
Mean	-3.23	-0.78	0.79	2.44	6.94
Std	0.78	0.72	0.72	0.85	1.56
			Excess Return: rx^j (without bid-ask)		
Mean	-1.77	0.41	0.96	2.77	4.71
SR	-0.17	0.04	0.11	0.31	0.48
			Long-Short: $rx^j - rx^1$ (without bid-ask)		
Mean		2.17	2.72	4.54	6.47
SR		0.44	0.47	0.71	0.90

Notes: This table reports summary statistics for currencies sorted into portfolios. We report the moments in dollars for average changes in log of the spot exchange rate Δs^j in portfolio j, the average log forward discount $f^j - s^j$, the average log excess return rx^j without bid-ask spreads, and the average returns on the long short strategy $rx^j - rx^1$. Log currency excess returns are computed as $rx^j_{t+1} = -\Delta s^j_{t+1} + f^j_t - s^j_t$. All moments are annualized and reported in percentage points. For excess returns, the table also reports Sharpe ratios, computed as ratios of annualized means to annualized standard deviations. Averages and standard deviations are reported in percentage points. The portfolios are constructed by sorting currencies into five groups at time t based on the one-month forward discount at the end of period $t-1$. Portfolio 1 contains currencies with the lowest interest rates. Portfolio 5 contains currencies with the highest interest rates. Data are monthly, from Barclays (Datastream). The sample period is 02/1976 - 01/2008.

Table 16: Asset Pricing - Portfolios of Countries in Burnside et alii (2008)

Panel I: Factor Prices and Loadings							
	$\lambda_{HML_{FX}}$	λ_{RX}	$b_{HML_{FX}}$	b_{RX}	R^2	$RMSE$	χ^2
GMM_1	6.60	3.39	1.04	0.33	95.70	0.38	
	[2.06]	[2.15]	[0.33]	[0.22]			74.53
GMM_2	6.29	3.42	0.99	0.33	95.36	0.39	
	[2.04]	[2.13]	[0.33]	[0.22]			75.08
FMB	6.60	3.39	1.04	0.33	95.70	0.38	
	[1.49]	[1.83]	[0.24]	[0.19]			64.74
	(1.49)	(1.83)	(0.24)	(0.19)			67.51
$Mean$	**6.38**	**3.41**					

Panel II: Factor Betas						
$Portfolio$	$\alpha_0^j(\%)$	$\beta_{HML_{FX}}^j$	β_{RX}^j	$R^2(\%)$	$\chi^2(\alpha)$	$p-value$
1	−0.22	−0.50	1.01	95.41		
	[0.48]	[0.02]	[0.02]			
2	−0.45	−0.11	1.10	92.83		
	[0.68]	[0.03]	[0.02]			
3	0.31	−0.01	0.97	91.22		
	[0.59]	[0.03]	[0.02]			
4	0.59	0.12	0.91	86.15		
	[0.75]	[0.03]	[0.02]			
5	−0.22	0.50	1.01	95.54		
	[0.48]	[0.02]	[0.02]			
All					1.24	0.94

Notes: Panel I reports results from GMM and Fama-McBeth asset pricing procedures. Market prices of risk λ, the adjusted R^2, the square-root of mean-squared errors $RMSE$ and the p-values of χ^2 tests on pricing errors are reported in percentage points. b denotes the vector of factor loadings. Excess returns used as test assets and risk factors take into account bid-ask spreads. All excess returns are multiplied by 12 (annualized). The standard errors in brackets are Newey and West (1987) standard errors computed with the optimal number of lags according to Andrews (1991). Shanken (1992)-corrected standard errors are reported in parentheses. We do not include a constant in the second step of the FMB procedure. Panel II reports OLS estimates of the factor betas. R^2s and p-values are reported in percentage points. The χ^2 test statistic $\alpha' V_\alpha^{-1} \alpha$ tests the null that all intercepts are jointly zero. This statistic is constructed from the Newey-West variance-covariance matrix (1 lag) for the system of equations (see Cochrane (2001), p. 234). Data are monthly, from Datastream. The sample of currencies corresponds to the one used in Burnside et alii (2008). The sample period is 2/1976 - 01/2008. The alphas are annualized.

Table 17: Beta-Sorted Currency Portfolios - Portfolios of Countries in Burnside et alii (2008)

Portfolio	1	2	3	4	5
			Spot change: Δs^j		
Mean	-1.54	0.14	0.75	1.11	0.41
Std	10.03	10.71	9.93	9.75	8.74
			Discount: $f^j - s^j$		
Mean	-2.80	-0.53	1.46	2.46	4.25
Std	0.75	0.84	0.80	0.89	1.07
			Excess Return: rx^j (without b-a)		
Mean	-1.26	-0.67	0.71	1.35	3.85
Std	10.16	10.78	10.00	9.73	8.80
SR	-0.12	-0.06	0.07	0.14	0.44
			High-minus-Low: $rx^j - rx^1$ (without b-a)		
Mean		0.59	1.97	2.61	5.10
Std		5.53	5.71	6.40	7.81
SR		0.11	0.34	0.41	0.65

Notes: This table reports, for each portfolio j, the average change in the log spot exchange rate Δs^j, the average log forward discount $f^j - s^j$, the average log excess return rx^j without bid-ask spreads and the average returns on the long short strategy $rx^j - rx^1$. The left panel uses our sample of developed and emerging countries. The right panel uses our sample of developed countries. Log currency excess returns are computed as $rx_{t+1}^j = -\Delta s_{t+1}^j + f_t^j - s_t^j$. All moments are annualized and reported in percentage points. For excess returns, the table also reports Sharpe ratios, computed as ratios of annualized means to annualized standard deviations. Portfolios are constructed by sorting currencies into six groups at time t based on slope coefficients β_t^i. Each β_t^i is obtained by regressing currency i log excess return rx^i on HML on a 36-period moving window that ends in period $t-1$. The first portfolio contains currencies with the lowest βs. The last portfolio contains currencies with the highest βs. Data are monthly, from Barclays and Reuters (Datastream). The sample is 2/1976 - 01/2008.

Table 18: Summary Statistics - Foreign Investors - Portfolios of Developed and Emerging Countries - Midpoint Conversion

Portfolio	1	2	3	4	5	6
Panel I: UK						
Excess Return: rx^j_{net}						
$Mean$	−5.21	−4.26	−3.88	−1.50	−1.16	−0.24
SR	−0.61	−0.52	−0.46	−0.18	−0.14	−0.03
Long-Short: $rx^j_{net} - rx^1_{net}$						
$Mean$		0.94	1.33	3.70	4.04	4.96
SR		0.18	0.23	0.56	0.61	0.55
Panel II: Japan						
Excess Return: rx^j_{net}						
$Mean$	−1.31	−2.12	−0.63	1.71	2.24	2.80
SR	−0.14	−0.21	−0.06	0.16	0.23	0.24
Long-Short: $rx^j_{net} - rx^1_{net}$						
$Mean$		−0.81	0.68	3.03	3.55	4.11
SR		−0.15	0.12	0.50	0.55	0.47
Panel III: Switzerland						
Excess Return: rx^j_{net}						
$Mean$	−3.02	−1.17	−1.09	0.58	1.56	2.23
SR	−0.40	−0.15	−0.12	0.07	0.20	0.22
Long-Short: $rx^j_{net} - rx^1_{net}$						
$Mean$		1.85	1.93	3.59	4.57	5.25
SR		0.33	0.32	0.55	0.72	0.60

Notes: This table reports summary statistics for currencies sorted into portfolios. We report averages and Sharpe ratios of log excess returns rx^j_{net} with bid-ask spreads and log excess returns on the long short strategy $rx^j_{net} - rx^1_{net}$ in *UK pounds*, in *Japanese yen*, and in *Swiss francs*. All moments are annualized and reported in percentage points. The portfolios are constructed by sorting currencies into six groups at time t based on the one-month forward discount (i.e nominal interest rate differential) at the end of period $t-1$. Portfolio 1 contains currencies with the lowest interest rates. Portfolio 6 contains currencies with the highest interest rates. Data are monthly, from Barclays and Reuters (Datastream). The sample period is 11/1983 - 03/2008.

Table 19: Asset Pricing - Foreign Investors

	λ_{HML}	λ_{RX}	R^2	$RMSE$	χ^2	λ_{HML}	λ_{RX}	R^2	$RMSE$	χ^2	$\lambda_{HML_{FX}}$	λ_{RX}	R^2	$RMSE$	χ^2
			UK					**Jap**					**Swi**		
GMM_1	5.54	−2.13	70.12	0.95		5.50	1.18	60.16	1.16		5.79	0.41	78.57	0.81	
	[2.34]	[1.87]			24.83	[2.21]	[2.13]			9.35	[2.25]	[1.69]			27.81
GMM_2	5.47	−2.25	69.66	0.96		4.73	1.92	41.85	1.40		6.23	0.62	76.55	0.85	
	[2.17]	[1.70]			24.89	[2.12]	[2.10]			10.76	[2.11]	[1.61]			28.30
FMB	5.54	−2.13	60.16	0.95		5.50	1.18	46.88	1.16		5.79	0.41	71.43	0.81	
	[1.83]	[1.46]			20.57	[1.77]	[1.87]			6.00	[1.78]	[1.46]			28.04
	(1.83)	(1.46)			22.28	(1.77)	(1.87)			6.80	(1.78)	(1.46)			30.03
$Mean$	**5.44**	**-2.13**				**4.85**	**1.18**				**5.92**	**0.42**			

$Portfolio$	α_0^i	β_{HML}^i	β_{RX}^i	R^2	α_0^i	β_{HML}^i	β_{RX}^i	R^2	α_0^i	β_{HML}^i	β_{RX}^i	R^2
			UK				**Jap**				**Swi**	
1	−0.48	−0.39	0.98	91.40	−0.11	−0.37	0.96	93.83	−0.75	−0.38	0.99	89.05
	[0.56]	[0.02]	[0.03]		[0.47]	[0.02]	[0.02]		[0.53]	[0.02]	[0.02]	
2	−0.90	−0.15	1.00	81.97	−1.94	−0.17	1.05	86.61	−0.44	−0.13	1.00	77.39
	[0.84]	[0.03]	[0.04]		[0.79]	[0.03]	[0.03]		[0.95]	[0.04]	[0.05]	
3	−0.78	−0.08	1.02	79.06	−0.67	−0.11	1.02	86.47	−0.31	−0.12	1.09	79.23
	[0.85]	[0.03]	[0.04]		[0.71]	[0.03]	[0.03]		[0.82]	[0.03]	[0.04]	
4	1.57	−0.08	0.99	73.07	1.53	−0.07	1.05	84.58	1.10	−0.07	1.00	72.33
	[0.91]	[0.04]	[0.04]		[0.88]	[0.04]	[0.05]		[0.97]	[0.04]	[0.05]	
5	1.06	0.09	1.02	77.77	1.31	0.09	0.96	84.47	1.15	0.08	0.94	76.23
	[0.79]	[0.04]	[0.04]		[0.84]	[0.04]	[0.03]		[0.84]	[0.04]	[0.05]	
6	−0.48	0.61	0.98	92.14	−0.11	0.63	0.96	96.05	−0.75	0.62	0.99	93.76
	[0.56]	[0.02]	[0.03]		[0.47]	[0.02]	[0.02]		[0.53]	[0.02]	[0.02]	
			$\chi^2(\alpha)$				$\chi^2(\alpha)$				$\chi^2(\alpha)$	
			7.30	0.29			14.28	0.03			4.48	0.61

Notes: Panel I reports results from GMM and Fama-McBeth asset pricing procedures. Market prices of risk λ, R^2, square-root of mean-squared errors $RMSE$ and p-values of χ^2 tests are reported in percentage points. b_1 represents the factor loading. The portfolios are constructed by sorting currencies into six groups at time t based on the interest rate differential at the end of period $t-1$. Portfolio 1 contains currencies with the lowest interest rate. Portfolio 6 contains currencies with the highest interest rate. Data are monthly, from Barclays and Reuters in Datastream. The sample period is 11/1983 - 03/2008. Excess returns used as test assets take into account bid-ask spreads. All excess returns are multiplied by 12. Standard errors are reported in brackets. Shanken-corrected standard errors are reported in parenthesis. Panel II reports results OLS estimates of the factor betas. The intercept α_0 β, and the R^2 are reported in percentage points. The standard errors in brackets are Newey-West standard errors computed with the optimal number of lags. The χ^2 test statistic $\alpha' V_\alpha^{-1} \alpha$ tests the null that all intercepts are jointly zero. This statistic is constructed from the Newey-West variance-covariance matrix (1 lag) for the system of equations (Cochrane (2001), p. 234). The portfolios are constructed by sorting currencies into six groups at time t based on the the currency excess return at the end of period $t-1$. Portfolio 1 contains currencies with the lowest previous excess return. Portfolio 5 contains currencies with the highest previous excess return. Data are monthly, from Barclays. The sample period is 11/1983 - 03/2008. Excess returns used as test assets take into account bid-ask spreads. All excess returns are multiplied by 12.

Table 20: Currency Portfolios - US Investor - Time Sub-Samples

Portfolio	1	2	3	4	5	6	1	2	3	4	5	6
	Panel I: 1983-1995						Panel II: 1995-2008					
	Spot change: Δs^j						Δs^j					
Mean	−2.59	−2.64	−1.29	−4.25	−1.61	1.67	0.42	−0.28	−1.87	−1.49	−0.49	2.06
Std	8.81	8.11	8.38	8.85	9.56	10.00	7.31	6.51	6.49	5.91	5.76	8.37
	Forward Discount: $f^j - s^j$						$f^j - s^j$					
Mean	−2.95	−1.28	0.18	1.53	3.12	7.72	−4.70	−1.33	−0.43	0.43	2.04	7.79
Std	0.68	0.65	0.63	0.67	0.65	2.45	2.02	0.29	0.29	0.30	0.49	1.72
	Excess Return: rx^j (without b-a)						rx^j (without b-a)					
Mean	−0.36	1.36	1.47	5.77	4.73	6.05	−5.11	−1.05	1.43	1.91	2.53	5.73
Std	8.91	8.22	8.42	8.99	9.70	10.17	7.53	6.52	6.54	5.97	5.83	8.41
SR	−0.04	0.17	0.17	0.64	0.49	0.60	−0.68	−0.16	0.22	0.32	0.43	0.68
	Net Excess Return: rx^j_{net} (with b-a)						rx^j_{net} (with b-a)					
Mean	1.00	0.29	−0.20	3.99	3.06	3.27	−4.00	−1.94	0.49	0.91	1.18	2.99
Std	8.92	8.21	8.35	8.91	9.68	10.15	7.49	6.52	6.56	5.97	5.86	8.41
SR	0.11	0.04	−0.02	0.45	0.32	0.32	−0.53	−0.30	0.08	0.15	0.20	0.35
	High-minus-Low: $rx^j - rx^1$ (without b-a)						$rx^j - rx^1$ (without b-a)					
Mean		2.95	4.33	6.59	6.46	8.83		4.06	6.55	7.03	7.65	10.84
Std		5.52	5.82	6.55	6.74	8.98		5.21	5.23	6.75	5.97	8.89
SR		0.31	0.32	0.94	0.76	0.71		0.78	1.25	1.04	1.28	1.22
	High-minus-Low: $rx^j_{net} - rx^1_{net}$ (with b-a)						$rx^j_{net} - rx^1_{net}$ (with b-a)					
Mean		−0.71	−1.20	2.99	2.06	2.27		2.06	4.49	4.91	5.18	6.98
Std		5.56	5.86	6.55	6.79	9.03		5.17	5.20	6.69	5.91	8.88
SR		−0.13	−0.20	0.46	0.30	0.25		0.40	0.86	0.73	0.88	0.79

Notes: This table reports, for each portfolio j, the average change in log spot exchange rates Δs^j, the average log forward discount $f^j - s^j$, the average log excess return rx^j without bid-ask spreads, the average log excess return rx^j_{net} with bid-ask spreads, and the average return on the long short strategy $rx^j_{net} - rx^1_{net}$ and $rx^j - rx^1$ (with and without bid-ask spreads). Log currency excess returns are computed as $rx^j_{t+1} = -\Delta s^j_{t+1} + f^j_t - s^j_t$. All moments are annualized and reported in percentage points. For excess returns, the table also reports Sharpe ratios, computed as ratios of annualized means to annualized standard deviations. The portfolios are constructed by sorting currencies into six groups at time t based on the one-month forward discount (i.e nominal interest rate differential) at the end of period $t-1$. Portfolio 1 contains currencies with the lowest interest rates. Portfolio 6 contains currencies with the highest interest rates. Both panels use data from developed and emerging countries. Data are monthly, from Barclays and Reuters (Datastream). The sample periods are 11/1983 - 1/1995 and 1/1995 - 03/2008.

Table 21: Asset Pricing - US Investor - Time Sub-Samples

Panel I: Factor Prices and Loadings

	1983-1995							1995-2008						
	$\lambda_{HML_{FX}}$	λ_{RX}	$b_{HML_{FX}}$	b_{RX}	R^2	$RMSE$	χ^2	$\lambda_{HML_{FX}}$	λ_{RX}	$b_{HML_{FX}}$	b_{RX}	R^2	$RMSE$	χ^2
GMM_1	3.41	2.52	0.34	0.33	36.09	1.21		7.21	0.36	0.81	0.18	77.93	1.03	
	[2.91]	[2.86]	[0.30]	[0.40]			44.23	[3.35]	[1.83]	[0.38]	[0.53]			22.93
GMM_2	3.22	1.78	0.33	0.23	11.75	1.42		7.37	0.26	0.83	0.16	77.67	1.03	
	[2.70]	[2.82]	[0.28]	[0.39]			45.29	[3.15]	[1.74]	[0.36]	[0.50]			22.98
FMB	3.41	2.52	0.34	0.33	36.09	1.21		7.21	0.36	0.81	0.18	77.93	1.03	
	[2.75]	[2.32]	[0.28]	[0.32]			43.14	[2.43]	[1.49]	[0.27]	[0.42]			31.32
	(2.75)	(2.32)	(0.28)	(0.32)			44.20	(2.44)	(1.49)	(0.27)	(0.42)			34.36
$Mean$	**2.65**	**2.48**						**7.66**	**0.44**					

Panel II: Factor Betas

	1983-1995						1995-2008					
$Portfolio$	$\alpha_0^j(\%)$	$\beta^j_{HML_{FX}}$	β^j_{RX}	$R^2(\%)$	$\chi^2(\alpha)$	$p-value$	$\alpha_0^j(\%)$	$\beta^j_{HML_{FX}}$	β^j_{RX}	$R^2(\%)$	$\chi^2(\alpha)$	$p-value$
1	-0.01	-0.40	1.03	93.33			-1.12	-0.38	1.11	89.03		
	[0.76]	[0.02]	[0.04]				[0.68]	[0.03]	[0.04]			
2	-1.40	-0.08	0.96	83.00			-0.78	-0.17	0.98	73.17		
	[1.03]	[0.04]	[0.05]				[1.11]	[0.03]	[0.07]			
3	-1.50	-0.17	0.90	72.15			0.94	-0.07	1.06	78.62		
	[1.50]	[0.06]	[0.06]				[0.85]	[0.03]	[0.04]			
4	2.03	0.01	1.00	76.30			1.42	-0.06	0.81	56.83		
	[1.33]	[0.06]	[0.08]				[1.03]	[0.04]	[0.07]			
5	0.90	0.03	1.08	77.25			0.67	0.06	0.94	75.46		
	[1.45]	[0.07]	[0.07]				[0.85]	[0.03]	[0.05]			
6	-0.01	0.60	1.03	94.77			-1.12	0.62	1.11	90.97		
	[0.76]	[0.02]	[0.04]				[0.68]	[0.03]	[0.04]			
All					3.71	0.72					7.66	0.26

Notes: The panel on the left reports results for all countries. The panel on the right reports results for the developed countries. Panel I reports results from GMM and Fama-McBeth asset pricing procedures. Market prices of risk λ, the adjusted R^2, the square-root of mean-squared errors $RMSE$ and the p-values of χ^2 tests on pricing errors are reported in percentage points. b denotes the vector of factor loadings. Excess returns used as test assets and risk factors take into account bid-ask spreads. All excess returns are multiplied by 12 (annualized). The standard errors in brackets are Newey and West (1987) standard errors computed with the optimal number of lags according to Andrews (1991). Shanken (1992)-corrected standard errors are reported in parentheses. We do not include a constant in the second step of the FMB procedure. Panel II reports OLS estimates of the factor betas. R^2s and p-values are reported in percentage points. The χ^2 test statistic $\alpha' V_\alpha^{-1} \alpha$ tests the null that all intercepts are jointly zero. This statistic is constructed from the Newey-West variance-covariance matrix (1 lag) for the system of equations (see Cochrane (2001), p. 234). Data are monthly, from Barclays and Reuters in Datastream. Both panels use data from developed and emerging countries. Data are monthly, from Barclays and Reuters (Datastream). The sample periods are 11/1983 - 1/1995 and 1/1995 - 03/2008.

Table 22: Asset Pricing - T-Bill portfolios

	λ_{HML}	λ_{RX}	b_{HML}	b_{RX}	R^2	$RMSE$	χ^2
				1953-2002			
GMM_1	4.10	0.25	8.39	-2.05	42.47	1.11	
	[1.25]	[1.10]	[2.76]	[3.60]			44.44
GMM_2	3.89	0.18	8.00	-2.13	42.09	1.11	
	[0.81]	[0.91]	[1.95]	[3.05]			45.47
FMB	4.10	0.25	8.22	-2.01	42.47	1.11	
	[1.17]	[0.84]	[2.34]	[2.54]			10.18
	(1.21)	(0.84)	(2.43)	(2.56)			24.16
$Mean$	**5.32**	0.128					
				1971-2002			
GMM_1	6.20	0.31	9.25	-2.48	72.50	0.92	
	[2.07]	[1.93]	[3.29]	[4.17]			78.19
GMM_2	5.80	0.30	8.65	-2.29	72.13	0.92	
	[1.09]	[1.18]	[1.96]	[2.73]			80.26
FMB	6.20	0.31	8.96	-2.41	72.50	0.92	
	[1.66]	[1.30]	[2.37]	[2.55]			68.36
	(1.73)	(1.30)	(2.49)	(2.57)			86.28
$Mean$	**6.92**	0.255					

Notes: This table reports results from GMM and Fama-McBeth asset pricing procedures. Market prices of risk λ, the adjusted R^2, the square-root of mean-squared errors $RMSE$ and the p-values of χ^2 tests are reported in percentage points. b_1 represents the factor loading. The portfolios are constructed by sorting currencies into six groups at time t based on the interest rate differential at the end of period $t-1$. Portfolio 1 contains currencies with the lowest interest rates. Portfolio 8 contains currencies with the highest interest rates. Data are annual, from Global Financial Data. Standard errors are reported in brackets. Shanken-corrected standard errors are reported in parentheses. We do not include a constant in the second step of the FMB procedure.

Table 23: Factor Betas - US Investor

$Portfolio$	α_0^j	β_{HML}^j	β_{RX}^j	R^2	α_0^j	β_{HML}^j	β_{RX}^j	R^2
	1971-2002				**1953-2002**			
1	-0.02	-0.46	0.97	80.91	0.02	-0.47	0.95	79.28
	[0.71]	[0.06]	[0.10]		[0.44]	[0.06]	[0.09]	
2	0.07	-0.03	0.62	41.16	-1.16	0.04	0.64	32.92
	[0.92]	[0.07]	[0.16]		[0.96]	[0.10]	[0.18]	
3	-0.77	-0.04	0.99	74.28	-0.58	-0.05	0.97	72.11
	[0.86]	[0.09]	[0.12]		[0.52]	[0.08]	[0.12]	
4	0.40	0.06	1.20	78.00	-0.33	0.09	1.19	73.25
	[1.02]	[0.10]	[0.13]		[0.75]	[0.09]	[0.13]	
5	-0.32	-0.09	0.98	56.83	0.38	-0.12	0.98	55.44
	[1.15]	[0.11]	[0.12]		[0.72]	[0.11]	[0.12]	
6	-1.38	0.16	1.05	67.44	-1.12	0.15	1.05	64.26
	[1.21]	[0.10]	[0.14]		[0.78]	[0.09]	[0.14]	
7	-0.02	0.54	0.97	88.39	0.02	0.53	0.95	87.25
	[0.71]	[0.06]	[0.10]		[0.44]	[0.06]	[0.09]	
8	2.07	-0.13	1.22	34.31	2.76	-0.17	1.28	34.00
	[3.40]	[0.19]	[0.44]		[2.10]	[0.15]	[0.40]	
$\chi^2(\alpha)$	1.09			4.55				
$p-value$	99.06			80.33				

Notes: This table reports results OLS estimates of the factor betas. The intercept α_0 β, and the R^2 are reported in percentage points. The standard errors in brackets are Newey-West standard errors computed with the optimal number of lags. The χ^2 test statistic $\alpha' V_\alpha^{-1} \alpha$ tests the null that all intercepts are jointly zero. This statistic is constructed from the Newey-West variance-covariance matrix (1 lag) for the system of equations (Cochrane (2001), p. 234). The portfolios are constructed by sorting currencies into six groups at time t based on the interest rate differential at the end of period $t-1$. Portfolio 1 contains currencies with the lowest interest rates. Portfolio 6 contains currencies with the highest interest rates. Data are annual from Global Financial Data. Standard errors are reported in parenthesis. Shanken-corrected standard errors are reported in brackets.

Table 24: Consumption Betas for HML_{FX}

	$\beta_c^{HML_{FX}}$	$p(\%)$	R^2	$\beta_d^{HML_{FX}}$	$p(\%)$	R^2
	Panel I: Nondurables			*Panel II: Durables*		
$1953-2002$	1.00		4.04	1.06		9.07
	[0.44]	2.23		[0.40]	0.89	
$1971-2002$	1.54		8.72	1.65		14.02
	[0.52]	0.28		[0.60]	0.63	

Notes: Each entry of this table reports OLS estimates of β_1 in the following time-series regression of the spread on the factor: $HML_{FX,t+1} = \beta_0 + \beta_1 f_t + \epsilon_{t+1}$. $HML_{FX,t+1}$ is the return on the seventh minus the return on the first portfolio. The estimates are based on annual data. The standard errors are reported in brackets. We use Newey-West heteroskedasticity-consistent standard errors with an optimal number of lags to estimate the spectral density matrix following Andrews (1991). The p-values (reported in %) are for a t-test on the slope coefficient. The factor f_t is non-durable consumption growth (Δc) in the left panel and durable consumption growth (Δd) in the right panel. The sample is $1953-2002$ in the upper panel and $1971-2002$ in the lower panel.

Table 25: Asset Pricing - HML_{FX} and Equity Volatility Risk Factor (Innovations) - All Countries

Panel I: Factor Prices and Loadings

	All Countries								
	$\lambda_{HML_{FX}}$	$\lambda_{Vol_{Equity}}$	λ_{RX}	$b_{HML_{FX}}$	$b_{Vol_{Equity}}$	b_{RX}	R^2	$RMSE$	χ^2
GMM_1	5.47	0.02	1.35	0.63	0.80	0.27	59.07	0.95	
	[2.34]	[3.49]	[1.73]	[0.52]	[9.66]	[0.35]			7.41
GMM_2	5.14	−2.11	0.49	0.31	−5.15	0.06	24.66	1.29	
	[2.22]	[3.34]	[1.68]	[0.49]	[9.23]	[0.33]			9.86
FMB	5.47	0.02	1.35	0.62	0.80	0.27	59.09	0.95	
	[1.81]	[3.60]	[1.34]	[0.50]	[9.92]	[0.27]			7.40
	(1.81)	(3.67)	(1.34)	(0.51)	(10.10)	(0.27)			8.27

Panel II: Factor Betas

	All Countries						
Portfolio	$\alpha_0^j(\%)$	$\beta^j_{HML_{FX}}$	$\beta^j_{Vol_{Equity}}$	β^j_{RX}	$R^2(\%)$	$\chi^2(\alpha)$	$p-value$
1	−0.55	−0.39	−0.04	1.06	91.37		
	[0.52]	[0.02]	[0.07]	[0.03]			
2	−1.25	−0.12	0.12	0.97	78.61		
	[0.76]	[0.03]	[0.08]	[0.05]			
3	−0.12	−0.12	−0.03	0.95	73.73		
	[0.83]	[0.03]	[0.12]	[0.04]			
4	1.58	−0.02	0.13	0.93	68.95		
	[0.87]	[0.04]	[0.10]	[0.06]			
5	0.88	0.04	−0.13	1.03	76.45		
	[0.79]	[0.04]	[0.11]	[0.05]			
6	−0.55	0.61	−0.04	1.06	93.04		
	[0.52]	[0.02]	[0.07]	[0.03]			
All						7.71	0.26

Notes: The panel on the left reports results for all countries. The panel on the right reports results for the developed countries. Panel I reports results from GMM and Fama-McBeth asset pricing procedures. Market prices of risk λ, the adjusted R^2, the square-root of mean-squared errors $RMSE$ and the p-values of χ^2 tests on pricing errors are reported in percentage points. b denotes the vector of factor loadings. Excess returns used as test assets and risk factors take into account bid-ask spreads. All excess returns are multiplied by 12 (annualized). The standard errors in brackets are Newey and West (1987) standard errors computed with the optimal number of lags according to Andrews (1991). Shanken (1992)-corrected standard errors are reported in parentheses. We do not include a constant in the second step of the FMB procedure. Panel II reports OLS estimates of the factor betas. R^2s and p-values are reported in percentage points. The χ^2 test statistic $\alpha' V_\alpha^{-1} \alpha$ tests the null that all intercepts are jointly zero. This statistic is constructed from the Newey-West variance-covariance matrix (1 lag) for the system of equations (see Cochrane (2001), p. 234). Data are monthly, from Barclays and Reuters in Datastream. The sample period is 11/1983 - 03/2008. The alphas are annualized and in percentage points.

Table 26: Asset Pricing - HML_{FX} and Equity Volatility Risk Factor (Innovations) - Developed Countries

Panel I: Factor Prices and Loadings

Developed Countries									
	$\lambda_{HML_{FX}}$	$\lambda_{Vol_{Equity}}$	λ_{RX}	$b_{HML_{FX}}$	$b_{Vol_{Equity}}$	b_{RX}	R^2	$RMSE$	χ^2
GMM_1	3.66	2.33	2.23	0.73	6.24	0.33	72.12	0.49	
	[2.54]	[3.58]	[2.21]	[0.45]	[8.81]	[0.26]			49.14
GMM_2	3.76	3.23	2.84	0.86	8.48	0.41	26.04	0.79	
	[2.53]	[3.36]	[2.13]	[0.43]	[8.27]	[0.25]			54.88
FMB	3.66	2.33	2.23	0.73	6.22	0.33	72.13	0.49	
	[1.80]	[2.67]	[1.71]	[0.37]	[6.60]	[0.20]			47.59
	(1.80)	(2.90)	(1.71)	(0.39)	(7.16)	(0.20)			53.28

Panel II: Factor Betas

Developed Countries							
$Portfolio$	$\alpha_0^j(\%)$	$\beta^j_{HML_{FX}}$	$\beta^j_{Vol_{Equity}}$	β^j_{RX}	$R^2(\%)$	$\chi^2(\alpha)$	$p-value$
1	0.02	−0.50	−0.11	1.00	94.98		
	[0.48]	[0.02]	[0.08]	[0.02]			
2	−0.90	−0.11	0.03	1.02	82.38		
	[0.82]	[0.05]	[0.14]	[0.04]			
3	0.95	−0.01	0.27	1.02	85.51		
	[0.83]	[0.04]	[0.12]	[0.03]			
4	−0.10	0.12	−0.09	0.97	81.46		
	[0.85]	[0.04]	[0.14]	[0.04]			
5	0.02	0.50	−0.11	1.00	93.92		
	[0.48]	[0.02]	[0.08]	[0.02]			
All						2.57	0.77

Notes: The panel on the left reports results for all countries. The panel on the right reports results for the developed countries. Panel I reports results from GMM and Fama-McBeth asset pricing procedures. Market prices of risk λ, the adjusted R^2, the square-root of mean-squared errors $RMSE$ and the p-values of χ^2 tests on pricing errors are reported in percentage points. b denotes the vector of factor loadings. Excess returns used as test assets and risk factors take into account bid-ask spreads. All excess returns are multiplied by 12 (annualized). The standard errors in brackets are Newey and West (1987) standard errors computed with the optimal number of lags according to Andrews (1991). Shanken (1992)-corrected standard errors are reported in parentheses. We do not include a constant in the second step of the FMB procedure. Panel II reports OLS estimates of the factor betas. R^2s and p-values are reported in percentage points. The χ^2 test statistic $\alpha' V_\alpha^{-1} \alpha$ tests the null that all intercepts are jointly zero. This statistic is constructed from the Newey-West variance-covariance matrix (1 lag) for the system of equations (see Cochrane (2001), p. 234). Data are monthly, from Barclays and Reuters in Datastream. The sample period is 11/1983 - 03/2008. The alphas are annualized and in percentage points.

Table 27: Asset Pricing - Currency Volatility Risk Factor (Innovations)

Panel I: Factor Prices and Loadings

	All Countries							Developed Countries						
	$\lambda_{Vol_{FX}}$	λ_{RX}	$b_{Vol_{FX}}$	b_{RX}	R^2	$RMSE$	χ^2	$\lambda_{Vol_{FX}}$	λ_{RX}	$b_{Vol_{FX}}$	b_{RX}	R^2	$RMSE$	χ^2
GMM_1	−1.67	1.34	−38.89	0.13	74.19	0.87		−1.58	2.24	−35.18	0.27	80.29	0.50	
	[0.88]	[2.30]	[20.68]	[0.45]			62.38	[0.98]	[2.60]	[21.85]	[0.30]			83.90
GMM_2	−1.54	1.23	−35.93	0.12	73.21	0.89		−1.74	2.52	−38.66	0.30	72.97	0.59	
	[0.80]	[2.28]	[18.63]	[0.44]			62.90	[0.94]	[2.58]	[20.92]	[0.30]			85.32
FMB	−1.67	1.34	−38.76	0.13	74.21	0.87		−1.58	2.24	−35.06	0.27	80.29	0.50	
	[0.54]	[1.34]	[12.67]	[0.26]			17.87	[0.71]	[1.71]	[15.84]	[0.20]			58.88
	(0.69)	(1.34)	(16.10)	(0.26)			43.14	(0.89)	(1.71)	(19.67)	(0.20)			74.54

Panel II: Factor Betas

	All Countries						Developed Countries					
$Portfolio$	$\alpha_0^j(\%)$	β_{RX}^j	$\beta_{Vol_{FX}}^j$	$R^2(\%)$	$\chi^2(\alpha)$	$p-value$	$\alpha_0^j(\%)$	$\beta_{Vol_{FX}}^j$	β_{RX}^j	$R^2(\%)$	$\chi^2(\alpha)$	$p-value$
1	−2.67	1.18	1.07	74.49			−1.87	1.05	1.06	77.62		
	[1.01]	[0.36]	[0.05]				[0.98]	[0.51]	[0.04]			
2	−1.90	0.58	0.97	76.45			−1.33	0.64	1.04	81.51		
	[0.75]	[0.34]	[0.05]				[0.86]	[0.35]	[0.04]			
3	−0.76	0.66	0.95	72.09			0.93	0.04	1.02	85.19		
	[0.85]	[0.38]	[0.05]				[0.83]	[0.37]	[0.03]			
4	1.49	0.11	0.93	68.79			0.36	−0.42	0.95	80.03		
	[0.85]	[0.50]	[0.06]				[0.88]	[0.32]	[0.04]			
5	1.10	−0.57	1.03	76.27			1.90	−1.30	0.93	72.37		
	[0.82]	[0.36]	[0.04]				[1.04]	[0.49]	[0.05]			
6	2.74	−1.96	1.05	59.96								
	[1.23]	[0.70]	[0.06]									
All					45.11	0.00					6.85	0.23

Notes: The panel on the left reports results for all countries. The panel on the right reports results for the developed countries. Panel I reports results from GMM and Fama-McBeth asset pricing procedures. Market prices of risk λ, the adjusted R^2, the square-root of mean-squared errors $RMSE$ and the p-values of χ^2 tests on pricing errors are reported in percentage points. b denotes the vector of factor loadings. Excess returns used as test assets and risk factors take into account bid-ask spreads. All excess returns are multiplied by 12 (annualized). The standard errors in brackets are Newey and West (1987) standard errors computed with the optimal number of lags according to Andrews (1991). Shanken (1992)-corrected standard errors are reported in parentheses. We do not include a constant in the second step of the FMB procedure. Panel II reports OLS estimates of the factor betas. R^2s and p-values are reported in percentage points. The χ^2 test statistic $\alpha' V_\alpha^{-1} \alpha$ tests the null that all intercepts are jointly zero. This statistic is constructed from the Newey-West variance-covariance matrix (1 lag) for the system of equations (see Cochrane (2001), p. 234). Data are monthly, from Barclays and Reuters in Datastream. The sample period is 11/1983 - 03/2008. The alphas are annualized and in percentage points.

Table 28: Asset Pricing - Currency Volatility Risk Factor (12-month rolling windows)

Panel I: Factor Prices and Loadings

	All Countries							Developed Countries						
	$\lambda_{Vol_{Equity}}$	λ_{RX}	$b_{Vol_{Equity}}$	b_{RX}	R^2	$RMSE$	χ^2	$\lambda_{Vol_{Equity}}$	λ_{RX}	$b_{Vol_{Equity}}$	b_{RX}	R^2	$RMSE$	χ^2
GMM_1	−0.18	2.40	−652.65	0.11	70.65	0.96		−0.14	3.25	−307.25	0.28	35.39	0.87	
	[0.09]	[1.92]	[341.01]	[0.43]			43.62	[0.08]	[2.12]	[189.86]	[0.26]			41.08
GMM_2	−0.13	1.56	−494.94	0.03	43.19	1.34		−0.11	3.53	−237.86	0.34	23.08	0.94	
	[0.07]	[1.84]	[274.14]	[0.42]			52.98	[0.06]	[2.08]	[143.38]	[0.26]			45.31
FMB	−0.18	2.40	−650.31	0.11	70.71	0.96		−0.14	3.25	−306.15	0.28	35.43	0.87	
	[0.05]	[1.33]	[180.21]	[0.29]			21.18	[0.07]	[1.73]	[155.06]	[0.22]			22.59
	(0.07)	(1.33)	(261.81)	(0.31)			60.85	(0.08)	(1.73)	(184.22)	(0.22)			38.37

Panel II: Factor Betas

	All Countries						Developed Countries					
$Portfolio$	$\alpha_0^j(\%)$	$\beta^j_{Vol_{Equity}}$	β^j_{RX}	$R^2(\%)$	$\chi^2(\alpha)$	$p-value$	$\alpha_0^j(\%)$	$\beta^j_{Vol_{Equity}}$	β^j_{RX}	$R^2(\%)$	$\chi^2(\alpha)$	$p-value$
1	−2.67	1.55	1.08	73.04			−1.87	0.97	1.07	76.70		
	[1.02]	[0.45]	[0.06]				[1.01]	[0.45]	[0.04]			
2	−1.76	0.02	0.93	74.22			−1.25	0.46	1.03	80.14		
	[0.77]	[0.38]	[0.05]				[0.87]	[0.39]	[0.04]			
3	−0.99	0.38	0.94	70.86			0.68	−0.09	1.01	85.28		
	[0.77]	[0.45]	[0.04]				[0.76]	[0.28]	[0.03]			
4	1.36	−0.83	0.97	70.52			0.50	−0.99	0.97	82.33		
	[0.85]	[0.57]	[0.06]				[0.82]	[0.26]	[0.04]			
5	1.35	−0.51	1.05	77.37			1.95	−0.36	0.92	69.78		
	[0.79]	[0.36]	[0.05]				[1.07]	[0.39]	[0.05]			
6	2.70	−0.60	1.04	55.68								
	[1.29]	[0.71]	[0.07]									
All					13.51	0.04					6.00	0.31

Notes: The panel on the left reports results for all countries. The panel on the right reports results for the developed countries. Panel I reports results from GMM and Fama-McBeth asset pricing procedures. Market prices of risk λ, the adjusted R^2, the square-root of mean-squared errors $RMSE$ and the p-values of χ^2 tests on pricing errors are reported in percentage points. b denotes the vector of factor loadings. Excess returns used as test assets and risk factors take into account bid-ask spreads. All excess returns are multiplied by 12 (annualized). The standard errors in brackets are Newey and West (1987) standard errors computed with the optimal number of lags according to Andrews (1991). Shanken (1992)-corrected standard errors are reported in parentheses. We do not include a constant in the second step of the FMB procedure. Panel II reports OLS estimates of the factor betas. R^2s and p-values are reported in percentage points. The χ^2 test statistic $\alpha' V_\alpha^{-1} \alpha$ tests the null that all intercepts are jointly zero. This statistic is constructed from the Newey-West variance-covariance matrix (1 lag) for the system of equations (see Cochrane (2001), p. 234). Data are monthly, from Barclays and Reuters in Datastream. The sample period is 11/1983 - 03/2008. The alphas are annualized and in percentage points.

Table 29: CAPM in Crisis

Portfolio	α_m^i	β_m^i	$p(\%)$	R^2	α_m^i	β_m^i	$p(\%)$	R^2	α_m^i	β_m^i	$p(\%)$	R^2	α_m^i	β_m^i	$p(\%)$	R^2
Sample	26-May-1998				02-Aug-1995				10-Oct-1999				31-Aug-2007			
1	−1.13	0.02	86.16	0.10	4.24	−1.22	0.09	18.20	−0.16	−0.13	16.91	7.33	0.15	−0.13	1.38	11.85
	[0.62]	[0.14]			[1.57]	[0.37]			[0.57]	[0.09]			[0.38]	[0.05]		
2	−0.64	−0.05	75.70	0.59	3.48	−0.90	8.76	8.52	−0.45	−0.11	5.19	9.30	0.17	0.21	0.04	27.84
	[0.92]	[0.16]			[1.90]	[0.53]			[0.35]	[0.05]			[0.37]	[0.06]		
3	−1.45	0.21	11.09	10.97	3.51	−0.89	7.88	11.97	0.85	−0.05	34.63	1.93	0.74	0.18	0.02	28.38
	[0.71]	[0.13]			[1.80]	[0.50]			[0.34]	[0.05]			[0.27]	[0.05]		
4	−1.43	0.28	2.50	13.55	2.21	−0.48	5.52	11.88	−0.24	−0.23	3.95	29.24	0.31	0.21	0.00	40.08
	[0.59]	[0.12]			[0.83]	[0.25]			[0.22]	[0.11]			[0.25]	[0.03]		
5	−1.81	0.50	0.00	23.41	2.14	−0.55	5.20	10.14	−0.40	0.06	22.28	4.82	0.51	0.25	0.00	45.52
	[0.47]	[0.11]			[0.92]	[0.28]			[0.30]	[0.05]			[0.23]	[0.04]		
6	−3.84	1.14	0.00	23.41	0.42	−0.00	98.46	10.14	0.80	0.25	0.00	4.82	0.44	0.50	0.00	45.52
	[1.53]	[0.27]			[0.43]	[0.14]			[0.48]	[0.05]			[0.43]	[0.10]		
HML_{FX}	−2.71	1.11	0.00	20.15	−3.82	1.22	0.02	11.24	0.96	0.37	0.03	20.87	0.29	0.62	0.00	56.12
	0.60	0.16			1.38	0.33			0.75	0.10			[0.38]	[0.08]		

Notes: This table reports results OLS estimates of the factor betas. The sample period is 129 days (6 months) before and including the mentioned date. The intercept α_0 β, and the R^2 are reported in percentage points. The standard errors in brackets are Newey-West standard errors computed with the optimal number of lags. The p-value is for a t-test on the slope coefficient. The portfolios are constructed by sorting currencies into six groups at time t based on the one-month forward discount (i.e nominal interest rate differential) at the end of period $t-1$. The returns are 1-month returns, and take into account bid-ask spreads. Portfolio 1 contains currencies with the lowest interest rates. Portfolio 6 contains currencies with the highest interest rates. Data are daily, from Barclays and Reuters in Datastream. We use the value-weighted return on the US stock market (CRSP).

Table 30: Correlation- Carry and Momentum Currency Portfolios - US Investor

Panel I: Correlation Matrix

Portfolio	$2-1$	$3-1$	$4-1$	$5-1$	$6-1$	$8-7$	$9-7$	$10-7$	$11-7$	$12-7$
	Carry					Momentum				
$2-1$	1.00									
$3-1$	0.56	1.00								
$4-1$	0.51	0.44	1.00							
$5-1$	0.51	0.41	0.58	1.00						
$6-1$	0.43	0.43	0.50	0.61	1.00					
$8-7$	0.08	0.03	0.06	-0.02	-0.26	1.00				
$9-7$	0.07	-0.01	0.04	-0.07	-0.27	0.78	1.00			
$10-7$	0.10	-0.04	0.11	0.05	-0.24	0.74	0.79	1.00		
$11-7$	0.14	0.02	0.17	0.11	-0.14	0.67	0.72	0.83	1.00	
$12-7$	0.09	-0.02	0.10	0.11	-0.09	0.65	0.69	0.78	0.82	1.00

Panel II: Principal Components

Portfolio	1	2	3	4	5	6	7	8	9	10	11	12
1	0.09	1.54	6.01	18.96	-0.30	-45	-3.80	3.94	-7.81	-2.95	-5.79	5.13
2	0.08	2.17	3.55	6.54	-2.25	35	-0.02	-4.64	8.12	5.14	-13.38	4.60
3	0.08	0.78	4.76	8.48	-7.73	81	5.64	-1.61	0.15	1.03	15.63	5.34
4	0.08	2.34	0.05	-11.38	12.43	-29	3.51	17.26	1.16	1.60	0.95	5.52
5	0.08	1.49	-2.80	-0.08	5.29	-133	-2.01	-10.74	5.09	-4.46	7.16	4.98
6	0.09	-4.31	-10.35	-9.72	-9.97	28	-1.62	0.46	-3.12	0.78	-3.05	9.31
7	0.09	-11.33	0.46	12.00	7.97	2	0.73	1.49	1.96	0.67	0.68	-5.02
8	0.09	-1.37	5.89	-17.31	-6.96	-93	6.53	-4.92	-3.13	-0.23	-5.45	-5.41
9	0.09	-0.11	5.15	-13.39	-6.16	68	-7.35	6.53	4.06	-4.74	2.44	-5.00
10	0.08	2.12	0.45	-7.04	7.28	13	-5.54	-7.21	-4.75	8.11	5.85	-4.15
11	0.09	3.32	-4.32	-0.02	9.70	128	3.82	-6.91	-2.19	-5.43	-5.32	-3.67
12	0.08	4.34	-7.84	13.98	-8.31	-54	1.09	7.35	1.44	1.48	1.28	-10.64
Var	67.02	8.94	6.62	3.19	2.95	2.36	2.10	1.99	1.53	1.51	1.45	0.35

Notes: Panel I of this table reports the correlations between the average return on the long short strategy $rx^j_{net} - rx^1_{net}$ (after bid-ask spreads) for the carry currency portfolios (1-6) and the momentum currency portfolios(7-12). Log currency excess returns are computed as $rx^j_{t+1} = -\Delta s^j_{t+1} + f^j_t - s^j_t$. The bottom panel reports the principal components of the log excess returns (after bid-ask spreads) on all 12 currency portfolios. The carry portfolios are constructed by sorting currencies into six groups at time t based on the one-month forward discount (i.e nominal interest rate differential) at the end of period $t-1$. Portfolio 1 contains currencies with the lowest interest rates. Portfolio 6 contains currencies with the highest interest rates. The momentum portfolios are constructed by sorting currencies into six groups at time t based on the return realized at the end of period $t-1$. Portfolio 7 contains currencies with the lowest past returns. Portfolio 12 contains currencies with the highest past returns. Data are monthly, from Barclays and Reuters (Datastream). The sample period is 11/1983 - 03/2008.

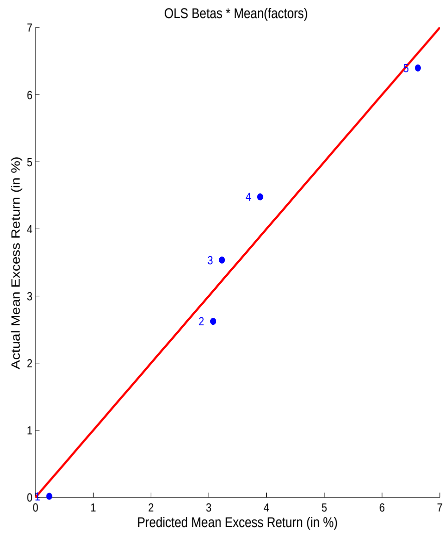

Figure 4: Predicted against Actual Excess Returns - Portfolios of Countries in Burnside et alii (2008).

This figure plots realized average excess returns on the vertical axis against predicted average excess returns on the horizontal axis. We regress each actual excess return on a constant and the risk factors RX and HML_{FX} to obtain the slope coefficient β^j. Each predicted excess returns is obtained using the OLS estimate of β^j times the sample mean of the factors. All returns are annualized. The data are monthly. The sample is 2/1976 - 01/2008.

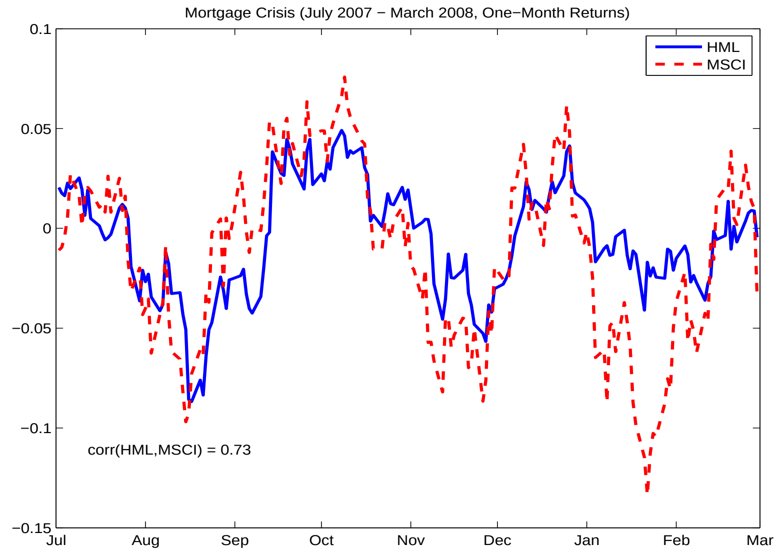

Figure 5: Carry Trade and US Stock Market Returns during the Mortgage Crisis - July 2007 to March 2008.

This figure plots the one-month HML_{FX} return at daily frequency against the one-month return on the US MSCI stock market index at daily frequency. The sample is 07/02/07-03/31/08.

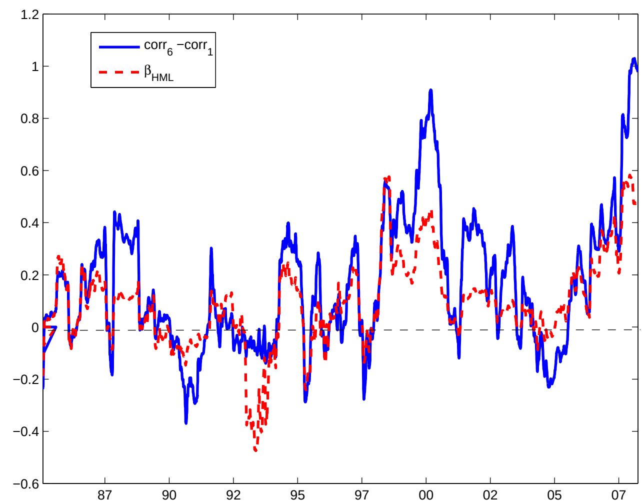

Figure 6: Market Correlation Spread of Currency Returns

This figure plots $Corr_\tau[R^m_t, rx^6_t] - Corr_\tau[R^m_t, rx^1_t]$, where $Corr_\tau$ is the sample correlation over the previous 12 months $[\tau - 253, \tau]$. We use monthly returns at daily frequency. We also plot the stock market beta of HML_{FX}, β_{HML} . The stock market return is the return on the value-weighted US index (CRSP).

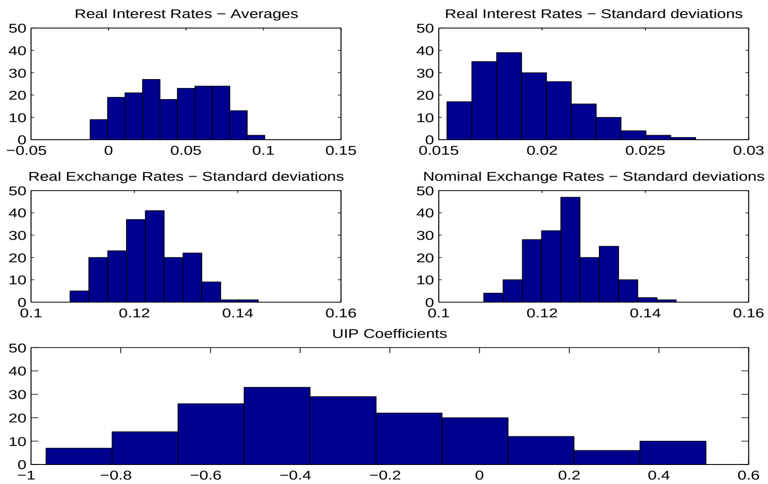

Figure 7: Interest Rates, Exchange Rates, and UIP Slope Coefficients - Simulated Data.

This figure plots several histograms summarizing our simulated data. We report the distributions of the interest rates' first two moments, the volatility of real and nominal exchange rates and the UIP slope coefficients.

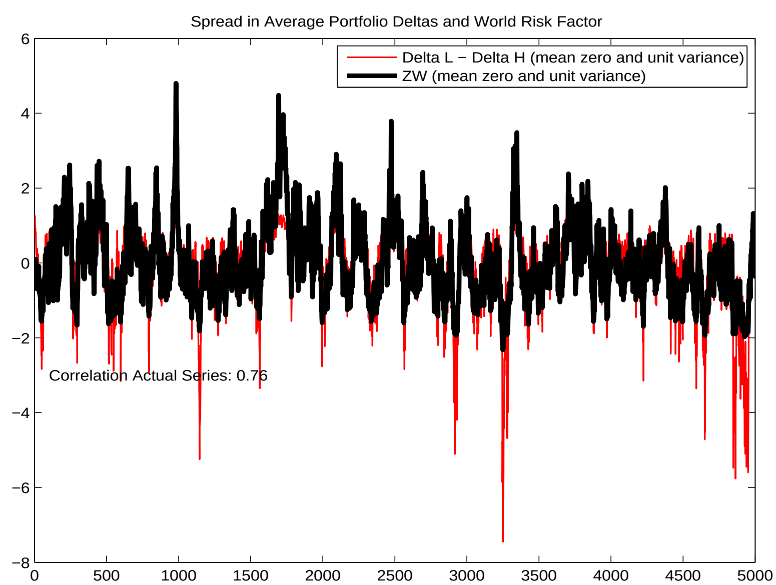

Figure 8: Spreads in Portfolio Deltas and World Risk Factor - Simulated Data.

This figure plots the difference between the average delta in the first portfolio and the average delta in the last portfolio, along with the world risk factor ZW. Both series are centered and scaled by their standard deviations.

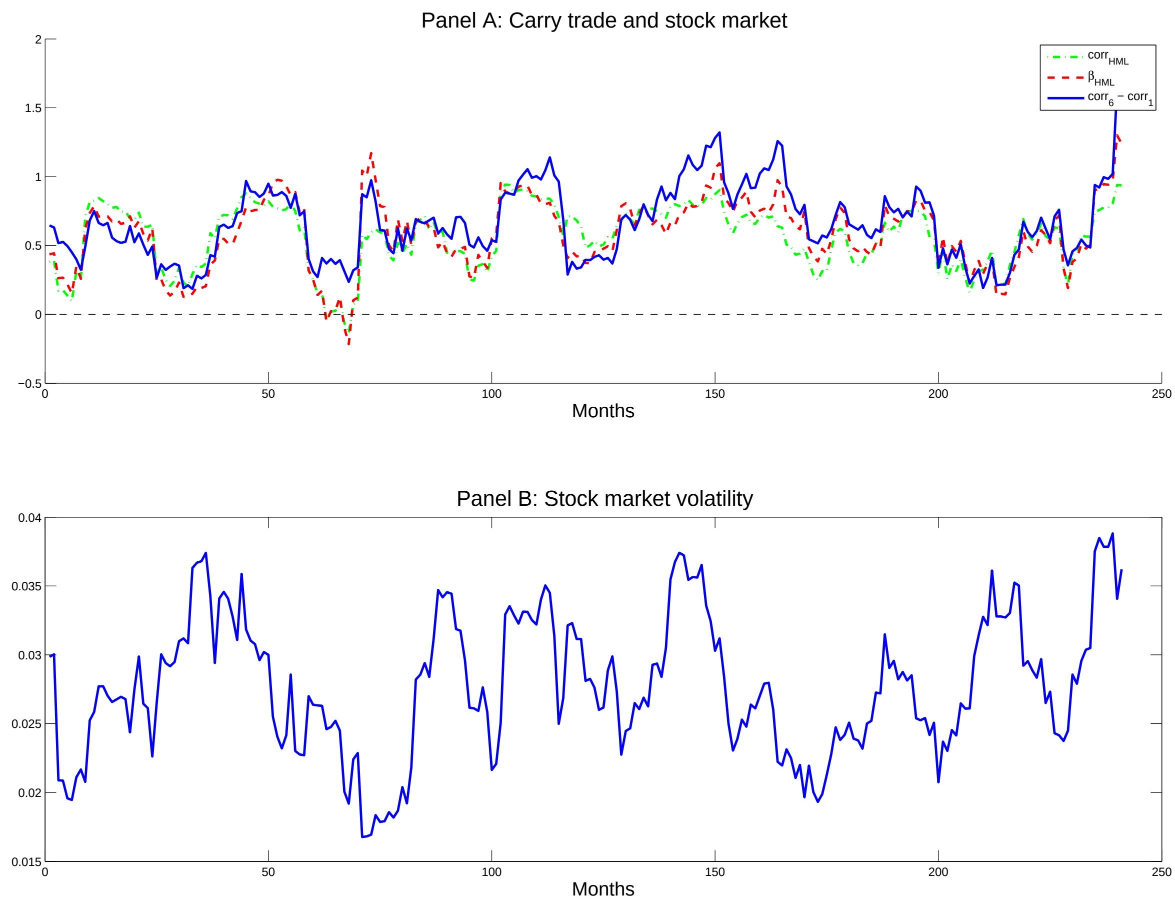

Figure 9: Stock market risk of the carry trade

This figure plots the conditional risk measures implied by the calibrated model. Panel A displays the conditional correlations and betas of the carry trade factor HML_{FX} with the stock market return simulated from the model. $corr_6 - corr_1$ denotes the difference in conditional correlations with the stock market return between the highest interest rate portfolio and the lowest interest rate portfolio, for a 20-year period (using monthly data). These quantities are estimated from simulated data using rolling 12-month windows. Panel B plots the standard deviation of the stock market return using the same rolling windows as the estimated betas.