University of Pretoria
Department of Economics Working Paper Series

Forecasting Local Currency Bond Risk Premia of Emerging Markets: The Role of Cross-Country Macro-Financial Linkages

Oguzhan Cepni
Central Bank of the Republic of Turkey
Rangan Gupta
University of Pretoria
I. Ethem Guney
Central Bank of the Republic of Turkey
M. Hasan Yilmaz
Central Bank of the Republic of Turkey
Working Paper: 2019-57
July 2019

Department of Economics
University of Pretoria
0002, Pretoria
South Africa
Tel: +27 12 420 2413

Forecasting Local Currency Bond Risk Premia of Emerging Markets: The Role of Cross-Country Macro-Financial Linkages

Oguzhan Cepni[a,*], Rangan Gupta[b], I. Ethem Güney[a], M. Hasan Yilmaz[b]

July 2019

Abstract

In this paper, we forecast local currency debt of five major emerging market countries (Brazil, Indonesia, Mexico, South Africa, and Turkey) over the period of January 2010 to January 2019 (with an in-sample: March 2005 to December 2018). We exploit information from a large set of economic and financial time series to assess the importance of not only "own-country" factors (derived from principal component and partial least squares approach), but also create "global" predictors by combining the country-specific variables across the five emerging economies. We find that while information on own-country factors can outperform the historical average model, global factors tend to produce not only greater statistical and economic gains, but also enhances market timing ability of investors, especially when we use the target-variable (bond premium) approach under the partial least squares method to extract our factors. Our results have important implications for not only fund managers but also policymakers.

Keywords: Bond risk premia, Emerging markets, Factor extraction methods, Out-of-sample forecasting.

JEL Classification: C22; C53; C55; G12

---

[a] Oguzhan Cepni (Oguzhan.Cepni@tcmb.gov.tr), I. Ethem Güney (Ethem.Guney@tcmb.gov.tr) and M. Hasan Yilmaz (Muhammed.Yilmaz@tcmb.gov.tr) Central Bank of the Republic of Turkey, Haci Bayram Mah. Istiklal Cad. No:10 06050 Ulus, Altndag, Ankara, Turkey.

[b] Department of Economics, University of Pretoria, Pretoria, 0002, South Africa; Email address: rangan.gupta@up.ac.za.

[*] Corresponding author.

1. Introduction

Local currency sovereign debt of emerging markets is a government bond denominated in the domestic currency of an emerging market issuer. Emerging countries have started to increasingly rely on their domestic debt markets for financing their expenditures, and hence, have issued bonds in domestic currencies. Further, these local currency bonds of emerging markets have caught the attention of global investors aiming to diversify their portfolios with the relatively higher yields on average derived from these bonds in comparison to their developed market counterparts. Naturally, the massive size of the local debt markets of emerging economies, which as of in 2017 stood at USD 21.9 trillion (International Monetary Fund, 2018), is hardly surprising. Understandably, it is of paramount importance to investors, as well as policymakers aiming to finance their expenditures, to determine the factors that drive the future path of local currency bonds of emerging markets.

Theoretically, the yield on a long term nominal government bond can be expressed as the sum of expectations of future short term rates over the maturity of the bond and a maturity-specific term-premium. Since long-term bonds have a greater duration to maturity than short-term debt, investors typically demand a risk-premium. In this regard, although large number of studies have investigated the determinants of bond premia for advanced economies (see, Cochrane and Piazzesi (2005), Ludvigson and Ng (2009, 2011), Laborda and Olmo (2014), Zhu (2015), Ghysels et al., (2018), Gargano et al., (2019), Cepni et al., (forthcoming a, b))[1], the corresponding literature on emerging market local currency bonds is scarce, with the existing studies primarily dealing with in-sample predictability (see for example, Miyajima et al., (2015), Akgiray et al., (2016), Gadanecz et al., (2018), Cepni and Güney (2019), Cepni et al., (2019a)). Miyajima et al., (2015) show that while resilient to global risk aversion shocks, forecasts of the domestic short-term interest rate, output growth and the fiscal balance explain a large part of the local currency bond yields of emerging markets. Akgiray et al., (2016) looked at predictability of local currency excess bond returns in the emerging markets of Brazil, Mexico, South Africa and Turkey. As in Ludvigson and Ng (2009, 2011), using a dynamic factor approach based on a large panel of economic and financial time series, these authors detected strong predictable variation in bond premia derived from macroeconomic activity. Gadanecz et al., (2018), based on a large sample of emerging countries, find that when the volatility and expected depreciation of the exchange rate increase, investors require a larger yield compensation for holding local

[1] In this regard, important earlier studies are that of Keim and Stambaugh (1986), Fama and Bliss (1987), Fama and French (1989), and Campbell and Shiller (1991).

currency bonds. While, Cepni and Güney (2019) highlight the role of credit ratings besides macroeconomic and financial (including exchange rate volatility) variables, Cepni et al., (2019a) document the importance of uncertainty related with economic policies in driving local currency bond premia of emerging countries.

Realizing that real time-forecasts are what is more important for fund managers than information of in-sample predictability (Welch and Goyal (2008)), and also the fact that the ultimate test of any predictive model (in terms of the econometric methodologies and the predictors used) is in its out-of-sample performance (Campbell (2008)), we build on the in-sample based evidence of Akgiray et al., (2016) in several directions, when conducting a full-fledged out-of-sample forecasting exercise. First, we not only extract common factors from a large datasets using principal component analysis, but also rely on partial least squares. The latter approach also constructs a set of latent factors from a large set of variables, but unlike principal components analysis, it estimates factors that are specifically valuable for forecasting a given target, which in our case is the local currency bond premia of emerging markets. Second, when extracting factors, we not only consider "own-country" variables, but also create factors by combining the country-specific variables across the five emerging economies. This resulting set of "Global" predictors, and its global subsets of "Macroeconomic" and "Financial" factors are used individually to specify new factors, which are then combined with the own-country factor model. Note that the motivation for doing this emanates from the widespread evidence of spillovers (comovements) across sovereign bond markets of emerging countries due to common underlying cross-country factors (Bunda et al., (2009), Subramaniam et al., (2016), Subramaniam and Prasanna (2017)). Third, given that forecasts for which conventional prediction error statistics outperform the benchmark models might not result in profitable investment strategies, we employ a directional accuracy test, which analyzes the market timing ability by constructing the hit ratio with the assumption related to the probability of independence between predictions and realizations. Fourth, since directional predictive ability does not ensure economic significance, we also analyse the economic value of active trading strategies formed on the local currency bond risk premium forecasts by utilizing the setting for a mean-variance investor aiming to optimally allocate wealth across risky and risk-free instruments using a utility-based metric. Finally, as a minor addition to the work of Akgiray et al., (2016), we also include Indonesia in our analysis besides Brazil, Mexico, South Africa and Turkey, as analysed by these authors. Note that, we select these five major emerging sovereign bond markets by notional amount outstanding.[2] Since these countries, as pointed out by Akgiray et al., (2016), share three

[2]Based on the Debt Securities Database of the Bank of International Settlements, the values in billions of USD in the first

essential features: (a) they belong to the J. P. Morgan Government Bond Index - Emerging Markets (GBI-EM), which is an investable index for emerging market local currency bonds; (b) they have large and liquid local currency bond markets in which search and trading costs are low; and (c) they offer long-term local bonds. Moreover, as of the first quarter of 2019, these five economies comprise of 26.7% of the total market size of local currency bonds of (18)[3] emerging markets in the GBI-EM index (Debt Securities Database, Bank of International Settlements), with Mexico (10.3%) leading the pack and followed by Turkey (5.7%), Indonesia (4.7%), Brazil (4.5%) and South Africa (1.5%).

To the best of our knowledge, this is the first paper to incorporate the role of local and global factors in forecasting the local currency bond risk premia of five important emerging countries over the period of January 2010 to January 2019 (given the in-sample of March 2005 to December 2009) from not only a pure statistical perspective, but also based on aspects of investment strategies and economic significance. The remainder of the paper is organized as follows: Section 2 discusses the data, Section 3 outlines the econometric methodologies, Section 4 presents the results, with Section 5 concluding the paper.

2. Data

The dataset used in this paper includes a relatively large set of economic indicators, consisting of 97, 87, 121, 114 and 105 economic series for Brazil, Indonesia Mexico, South Africa, and Turkey respectively. These series are selected to represent a broad range of macroeconomic variables relating to supply-side indicators, such as industrial production indexes, and demand-side indicators, such as electricity consumption and motor-vehicle sales. In addition to macroeconomic variables, we also include commonly accepted technical indicators of stock markets, namely, the price-earnings ratio, the dividend yield and price to book ratio, etc. All data were downloaded from Bloomberg, and a complete list of variables is available in Tables A1 to A5 of the online appendix. All variables are subject to preliminary transformations to induce stationarity as needed.

More specifically, the dataset covers the period March 2005 to January 2019 and can be classified into seven categories:

---

quarter of 2019 stood at 119, 123, 271, 38, and 151 for Brazil, Indonesia, Mexico, South Africa, and Turkey respectively (available at: https://www.bis.org/statistics/full_data_sets.htm).

[3]The remaining 13 countries are: Chile, China, Colombia, Hungary, India, Malaysia, Nigeria, Peru, Philippines, Poland, Romania, Russia, and Thailand.

- *Housing and order variables:* house price index, completed buildings recorded and new orders;
- *Labor market variables:* employment, labor participation rate and unemployment rate;
- *Prices:* producer prices and consumer prices;
- *Financial variables:* interest rates, exchange rates, implied volatility and stock prices;
- *Money, credit and quantity aggregates:* money supply, mortgage loans, time and sight deposits;
- *Real economic activity:* PMI survey, industrial production, retail sales and consumer confidence;
- Technical indicators: price to book ratio, total debt to total assets and dividend payout ratio.

In addition to the above set of macroeconomic and financial indicators, which are used in our construction of local and global factors, we collect monthly observations of 1-year, 2-year, 3-year, 4-year and 5-year zero coupon bond prices for the Brazil, Indonesia, Mexico, South Africa and Turkey. We follow Cochrane and Piazzesi (2005) for the notation of excess bond returns and yields. Let ${p_t}^{(n)}$ be the log price of n-year discount bond at time t. Then the log-yield is ${y_t}^{(n)} = \frac{-1}{n}{p_t}^{(n)}$. We denote the log holding period return from buying n year bond at time t and selling an $n-1$ year bond at time $t+1$ as: ${r_{t+1}}^{(n)} = {p_{t+1}}^{(n-1)} - {p_t}^{(n)}$. Finally, the excess returns are computed using the following equation:

$$rx_{t+1}^{(n)} = r_{t+1}^{(n)} - {y_t}^{(1)} \tag{1}$$

where $rx_{t+1}^{(n)}$ denote the continuously compounded excess bond returns on a n-year zero coupon bond in period $t+1$. Put differently, the risk premium on n-year discount bond over a short-term bond is the difference between the holding returns of the n-year and the 1-year bonds.

3. Empirical methodology

3.1. Extraction of common factors

We estimate the common factors from a large dataset of macroeconomic variables to explore the relevance of incorporating richer information sets into the analysis of local currency bond risk premium. Since using a large set of predictors exacerbates parameter estimation uncertainty, standard least squares or other estimation methods seem to be infeasible given problems like multi-collinearity and degrees of freedom. Thus, we employ the widely used dimensionality-reduction techniques, namely, principal component analysis and partial least squares.

3.1.1. Principal component analysis

Principal component analysis (PCA) is the most popular multivariate statistical method utilized for data reduction and size compression. It aims to extract the important information from a large data set by expressing it as a set of new orthogonal variables called principal components. In this context, the factor representing the highest proportion of the total variation across variables is termed as the first principal component which captures the common movements. Technically, the PCA method identifies the directions in the data with most variation (which are called eigenvectors) by conducting spectral decomposition of the correlation (or covariance) matrix of the data. Let D represent the $p \times p$ correlation matrix to be analyzed. The eigendecomposition of D can be illustrated as follows in which v_i terms represent eigenvectors (principal components):

$$\begin{aligned} D &= V\Lambda V' \sum_{i=1}^{p} \lambda_i v_i v_i' \\ v_i v_i' &= \delta_{ij} \\ \lambda_1 \geq \lambda_2 \geq ...\lambda_p \geq 0 \end{aligned} \tag{2}$$

The widespread use of PCA method in financial economics and forecasting practices is discussed in Stock and Watson (2002a, b), Bai and Ng (2002), Diebold and Li (2006) and Ludvigson and Ng (2009, 2011). Moreover, it is also preferred particularly in the regarding stock return predictabilities. Some recent works in the literature show that prediction about excess stock returns can be improved by exploiting the factors obtained from a large set of macroeconomic and financial variables through factor models, as argued by Bai (2010), Neely et al. (2014), Çakmaklı and van Dijk (2016).

3.1.2. Partial least squares

As discussed by Bai and Ng (2008) and Boivin and Ng (2006), the performance of the PCA may be poor in forecasting the target variable when other factors dominate the predictive ability of a target-relevant factor. In static factor models, it might be the case that the included factors do not reflect the most relevant information for the excess bond returns that we want to forecast. In order to overcome this issue, we utilize the partial least squares (PLS) method of Wold (1966). This technique also constructs a set of latent factors from a large set of variables, but unlike the PCA, it estimates factors that are specifically valuable for forecasting a given target. Although Kelly and Pruitt (2015) show that PLS and PCA extract asymptotically similar factors when the data has a strong factor structure, Groen and Kapetanios (2016) demonstrate that

PLS outperforms PCA in forecasting the target variable in the presence of weak factor structure for the predictor variables, for which PCA is known to be inconsistent.

The PLS method is applied by following the two-step procedure explained in Friedman et al. (2001). The algorithm starts by standardizing each candidate predictor variable x_j ($j = 1, \ldots, p$) to have zero mean and unit variance. Then, univariate regression coefficients $\widehat{\gamma_{1j}} = \langle x_j, y \rangle$ are stored for each j. From this, the first PLS direction $z_1 = \sum_j \widehat{\gamma_{1j}} x_j$ is obtained as the weighted sum of the vector of univariate regression coefficients and original set of predictor variables. Thus, the construction of the PLS direction includes the degree of association between excess bond returns and common factors. In the following step, the "target" variable y is regressed on z_1, resulting in a coefficient θ_1, and then all inputs are orthogonalized with respect to z_1. This process is iterated until PLS produces a sequence of $l < p$ orthogonal directions.

Since PLS uses the excess bond returns to construct the directions, its solution path is a non-linear function of excess bond returns. As stated in Bianchi et al. (2019), it differs from PCA in the sense that, while PCA seeks directions that maximize only the variance, PLS aims for the directions that have high variance and high correlation with the target variable simultaneously. In particular, the m^{th} PLS direction $\widehat{\gamma_m}$ solves the following optimization problem:

$$\begin{aligned} &\max_{\alpha} && Corr^2(y, X_\alpha) Var(X_\alpha), \\ &\text{subject to} && \|\alpha\| = 1, \quad \alpha' S \widehat{\gamma_l} = 0, \quad l = 1, ..., m-1 \end{aligned} \tag{3}$$

where S represents the sample covariance matrix of the x_j.

3.2. Factor-augmented predictive regressions

The approach that we consider in this paper is based on the assumption that the large set of macroeconomic variables available obey a factor structure of the form:

$$X_t = \lambda F_t + \xi_t, \qquad \xi_t \sim N(0, \Sigma_e), \tag{4}$$

where F_t is an $n \times 1$ vector of unobserved common factors ($n \leqslant N$) with zero mean and unit variance, that reflect "most" of the co-movements in the variables; λ is a corresponding $n \times 1$ vector of factor loadings; and the idiosyncratic disturbances, ξ_t, are uncorrelated with F_t at all leads and lags, and have a diagonal covariance matrix, Σ_e. Given such estimates of common factors, we consider a factor-augmented predictive regression for excess bond returns of the following form:

$$rx_{t+h}^{(n)} = \mu + \beta' f_t + \varepsilon_{t+h}, \tag{5}$$

where dimension of f_t is $r \times 1$, with $r \leqslant n$; μ is an intercept term; β is $r \times 1$ dimensional vector of slope parameters; and ε_{t+h} is again an unobserved disturbance term with mean zero. Nevertheless, the excess bond return itself does not need to be dependent on the full set of F_t, it is important to select the number of factors r to be included in predictive regressions. In order to select the number of factors (r) in Eq. (5), we search across all combinations, for $r = 1, ..., 5$ and choose the model for each country by comparing the out-of-sample performance for all combinations of parameters.[4]

3.3. Forecasting experiment

We carry out two types of experiment. In our first set of experiments, we investigate the forecasting performances of factor-augmented predictive regressions where the factors are constructed using both PCA and PLS methods based on only local or "own-country" variables of a specific country. We label this specification (1) as the "Local factor model". Our second set of experiments include combining the country-specific variables used in our first set of experiments across all five countries. This resulting set of "Global" predictors (which includes all variables) is then partitioned into two sets of variables: "Macroeconomic" (includes only macroeconomic variables) and "Financial" (includes only financial variables). These subsets of variables are then used individually to specify new factors that are combined with our Local factor model. In particular, we add three new specifications (2-4) as follows:

- **Specification 1**: Local factor model
  $rx_{t+h}^{(n)} = \mu + \beta' f_t^{Local} + \varepsilon_{t+h}$
- **Specification 2**: EM macro factor model
  $rx_{t+h}^{(n)} = \mu + \beta' f_t^{Local} + \vartheta' f_t^{EMMacro} + \varepsilon_{t+h}$
- **Specification 3**: EM financial factor model
  $rx_{t+h}^{(n)} = \mu + \beta' f_t^{Local} + \theta' f_t^{EMFinancial} + \varepsilon_{t+h}$
- **Specification 4**: EM global factor model
  $rx_{t+h}^{(n)} = \mu + \beta' f_t^{Local} + \delta' f_t^{EMGlobal} + \varepsilon_{t+h}$

We evaluate the forecasting performance of the above factor-augmented regression models by using a recursive forecasting scheme, i.e., by expanding the model estimation sample prior to the construction of

[4] We also used the Bai and Ng (2002) criterion for selecting r, and found that it chooses more factors than our approach, resulting in a deterioration of forecast accuracy.

each new forecast. The estimation sample starts on March 2005, and our out-of-sample evaluation period is January 2010 to January 2019, with the start of the forecast evaluation corresponding to the turmoil in the global bond markets as a result of the European sovereign debt crisis. For each month, we produce a sequence of six h-month-ahead forecasts, i.e., h = 1; 2; 3; 6; 9; 12. Finally, we use the mean squared forecast error (MSFE)-adjusted test of Clark and West (2007) to compare forecast performance relative to the random walk (RW) model. While comparison with the RW model is a standard exercise in most forecasting applications, as it allows us to quantify the accuracy gains associated with models that incorporate additional exogenous (own-country) information, evaluation relative to the the specification types 2-4 allows us to quantify the importance of cross-country macro-financial linkages when forecasting the excess bond returns.

3.4. Market timing

As argued by Leitch and Tanner (1991) and Pesaran and Timmermann (1995) among others, traditional statistical measures might ignore the implications of predictive models in terms of investors. Put differently, forecasts for which conventional prediction error statistics turn out to outperform the benchmark models might not result in profitable investment strategies. To fill this gap, we employ the directional accuracy test of Pesaran and Timmermann (1992). This non-parametric test analyzes the market timing ability by constructing the hit ratio with the assumption related to the probability of independence between predictions and realizations. In this context, the hit ratio can be defined as the share of periods (months), for which the sign of excess bond returns is predicted correctly, in the entire sample period. The Null hypothesis of this test is specified as the lack of relationship between the actual and the predicted directional changes. In our case, the null hypothesis is formulated as the non-existence of market timing ability, and is tested with the empirical hit ratio by examining whether or not the empirical indicator is significantly larger than the expected hit ratio.

Given that $\hat{P}$ and $\hat{P}^*$ represent actual and expected hit ratios (under independence assumption) respectively, we can provide the following representations:

$$\begin{aligned} \hat{P} &= \frac{1}{n}\sum_{t=0}^{n-1} I[r_{b,t+1}\hat{r}_{b,t+1}] \\ \hat{P}^* &= \hat{P}_r\hat{P}_{\hat{r}} + (1-\hat{P}_r)(1-\hat{P}_{\hat{r}}) \end{aligned} \tag{6}$$

where $I[.]$ is the indicator function which takes the value one when the multiplication of realized excess bond return ($r_{b,t+1}$) with forecasted excess bond return ($\hat{r}_{b,t+1}$) is positive, while it takes the value zero

otherwise. In a similar manner, expected hit ratio is a function of the proportion of time periods for which actual ($\hat{P}_r = \frac{1}{n}\sum_{t=1}^{n} I[r_{b,t+1}]$) and predicted ($\hat{P}_r = \frac{1}{n}\sum_{t=1}^{n} I[\hat{r}_{b,t+1}]$) local currency bond risk premia are positive. Then, the directional accuracy (DA) statistic can be formulated as follows:

$$DA = \frac{\hat{P} - \hat{P}_*}{\sqrt{\hat{V}(\hat{P}) - \hat{V}(\hat{P}_*)}} \tag{7}$$

where $\hat{V}(\hat{P})$ and $\hat{V}(\hat{P}_*)$ stand for estimates of variances of $\hat{P}$ and $\hat{P}_*$, respectively.

3.5. Economic value analysis

Since directional predictive ability does not ensure economic significance, our methodological framework also incorporates the economic value of active trading strategies formed on the local currency bond risk premium forecasts. To this end, we utilize the setting for a mean-variance investor, who optimally allocates the wealth across a "risky asset" and "risk-free instrument." In particular, this setting is constructed based on a myopic risk-averse investor with one-period horizon. We develop a utility-based metric to assess the willingness of the investor, in terms of return-based values, for switching from passive investment strategy to an active one, given the informative content of our bond risk premia predictions. The employed procedure is frequently used to determine the economic value of dynamic investment strategies (Fleming et al., (2001), De Pooter et al., (2008)), and is widely preferred for analyzing the superiority of factor-augmented predictions in the equity risk premia literature (Campbell and Thompson (2008), Ferreira and Santa-Clara (2011), Neely et al., (2014), Çakmaklı and van Dijk (2016), Buncic and Tischhauser (2017)). Economic value analysis also paves the way for the calculation of certainty equivalent return (CER), as well as the incorporation of risk aversion behavior, lack of which is the weakness of many empirical studies.

In general, the mean-variance investor is assumed to maximize the expected utility from her asset allocation decision with the following objective function:

$$\max_{w_{t+1}} U(R_{p,t+1}) = E_t(R_{p,t+1}) - \frac{1}{2}\gamma Var_t(R_{p,t+1}) \tag{8}$$

where $R_{p,t+1}$ stands for the return on investor's portfolio. $E_t(R_{p,t+1})$ and $Var_t(R_{p,t+1})$ represent the expected value and the variance of the portfolio return, with respect to time period t+1 conditional on the information set available in time period t. Furthermore, γ measures the investor's degree of relative risk aversion. At the end of period t, the investor is assumed to optimally allocate a portion of the funds w_t to risky asset which

is local currency sovereign bond, while remaining part is invested in a risk-free instrument during period $t+1$. Thus, the portfolio return can be represented as follows:

$$R_{p,t+1} = r_{f,t+1} + w_{t+1} r_{b,t+1} \tag{9}$$

where $r_{f,t+1}$ and $r_{b,t+1}$ denote risk-free return and excess bond return, respectively. Assuming that the risk-free rate of return is fixed at the end of period, the solution of the investor to the utility maximization problem yields the following portfolio variance and optimal portfolio weight for long-term bonds as follows:

$$\begin{aligned} Var_t(R_{p,t+1}) &= w_{t+1}^2 Var_t(r_{b,t+1}) \\ w_{t+1}^* &= \frac{1}{\gamma} \frac{E_t(r_{b,t+1})}{Var_t(r_{b,t+1})} \end{aligned} \tag{10}$$

In this case, the optimal asset allocation decision is performed by considering the forecast of bond risk premia and its variance is given the information available up to time t. Hence, we assume that the representative investor utilizes recursive excess bond return predictions as an estimate of conditional expected returns. On the other hand, our framework includes several assumptions. Firstly, a 3-year rolling window of past returns is used to estimate the forecast variance of the bond risk premia. Secondly, the portfolio share of the risky asset is constrained with an interval of 0 and 1.5 following Neely et al. (2014). This assumption is deemed to be realistic given that it not only allows for short-sale, but it also embodies the restriction on the leverage of portfolio with 50% threshold. Lastly, the coefficient of relative risk aversion γ is set to 5 .

Then, the CER for the portfolio is calculated as follows:

$$CER_p = \hat{\mu}_p - \frac{1}{2}\gamma \hat{\sigma}_p^2 \tag{11}$$

where, $\hat{\mu}_p$ and $\hat{\sigma}_p^2$ are the sample mean and variance for the portfolio return $R_{p,t+1}$ over the forecast evaluation period. This indicator can be interpreted as the absolute fixed return for which an investor will be willing to abandon the investment in the risky portfolio. In line with this, CER gains can be defined as the difference between the CER indicator calculated for an investor who uses the informative nature of the predictive regression forecasts, and CER for an investor who takes input from the historical average forecasts into consideration For making investment decisions as a benchmark strategy. This difference is multiplied with 1200 to be interpreted as the annual percentage portfolio management fee that would be paid to use the predictive factor-augmented regression forecasts. Similar to Neely et al. (2014), we assume

the portfolio transaction cost to be equal to 50 basis points. The following equation determines the change in the CER based on the discussion above:

$$\Delta CER^{factor-augmented} = 1200 * (CER^{factor-augmented} - CER^{benchmark}) \tag{12}$$

4. Empirical Results

4.1. Out-of-sample forecasting results

Tables 1 to 5 summarizes the results of our experiments, in which we compare the four different specification types that are used for forecasting excess bond returns. Additionally, each of these specification types is estimated using both PCA and PLS. The tables are partitioned vertically into four sets of results for 2-year, 3-year, 4-year and, 5-year excess bond returns across five emerging market economies, respectively. In each of the tables, entries in the first row correspond to MSFEs associated with forecasts constructed using the RW model. All other entries in the tables are MSFEs of the other models relative to the RW model.

The results in Tables 1 to 5 reveal various interesting observations. First, we observe that the MSFE values generally increase with the forecast horizons. Second, virtually all of the entries in Tables 1 to 5 are less than unity, indicating that the factor-augmented predictive regressions generally produce quite accurate predictions relative to the benchmark RW model. Third, this observation is further supported by the test of Clark and West (2007), noting that entries with "stars" indicate rejection of the null hypothesis of equal predictive accuracy indicating statistically significant improvements in forecast accuracy compared to the RW model.

Fourth, our results indicate that there are notable decreases in MSFE for a number of countries when "macro" and "global" factors extracted from our pooled dataset across the emerging market countries included in the predictive regressions, especially for Brazil, Indonesia, and Mexico. For example, note that in Table 1 (i.e., the case of Brazil) the inclusion of emerging market global factors result in best MSFE-models in 10 out of the 24 cases.[5] For Indonesia (see Table 2), the model which includes the emerging market macro factors attain the top rank in 14 out of 24 cases. The predictive power of emerging market macro factors is particularly notable for longer maturity of excess bond returns, and also for longer forecast horizons. Since

[5]Recall that there are six different forecast horizons and four different maturities for excess bond returns. Hence there are a total of 24 specification types for each country.

the risk premia on long-term bonds are subject to more sizeable price fluctuations than short-term bonds, investors are more likely to require a higher risk premium for holding long-duration assets. Moreover, this result provides further evidence which supports the main finding of Ludvigson and Ng (2009) on the forecasting power of broad macro factors for excess bond returns. The picture is equally clear for Mexico, in which emerging market global factors yield substantial predictive gains in 12 out of 24 cases. This implies that global factors contain information about future excess bond returns beyond what is captured by local factors.

Fifth, if one delves more deeply into the findings concerning for South Africa, a different pattern emerges. In particular, note that for South Africa, the specification types that include only local factors yield the best MSFEs in 14 out of 24 cases. Thus, global information appears to lose its predictive content, relative to local information. Since South Africa's sovereign credit has one of the highest investment rating[6] among the emerging markets, the share of non-residents holding of the country's bonds is 38% as of the last quarter of 2018, according to the Government and Debt Contingent Liabilities database of the South African National Treasury.[7] This result provides evidence that global investors differentiate meaningfully between emerging markets regarding local macroeconomic fundamentals, and do not view the local currency debt markets as a single asset class. On the other hand, emerging market financial factors play a key role in forecasting Turkish excess bond returns. Comparing the various model specifications, we observe that the model embodying local and emerging market financial factors attain the top rank in 20 out of 24 cases. This result is consistent with the argument that the low level of domestic savings and heavy-reliance on capital inflows to finance new investment projects in Turkey reflect the importance of financial factors due to the global swings in investor sentiment (Cepni et al. (2019b)).

Lastly, an inspection of Tables 1 to 5 also reveal that taking into account the specific-target when constructing factors improves the out-of-sample forecasting performances of factor-augmented models further. This is because we extract orthogonal PLS factors sequentially, utilizing the remaining covariances of the target and the predictor variables. Since the PCA method uses only the predictor variables ignoring the target to extract common components, there is no guarantee that they are in any way close to the best factors that include valuable information for predicting the excess bond returns.

– Insert Tables 1 to 5 about here. –

[6] Moody's: Baa3; S&P: BB; Fitch: BB+.

[7] http://www.treasury.gov.za/documents/National%20Budget/2019/review/Chapter%207.pdf.

Overall, our findings suggest that global investors (and policymakers) should consider the cross-country linkages across emerging markets when predicting the excess bond returns. Putting it differently, we have substantial evidence that global emerging market factors have useful predictive content, suggesting that macro-financial linkages across emerging markets can be accurately modeled using dimension-reduction methods. This is line with the growing integration of emerging markets economies, which is likely to result in transmission of economic shocks via trade and financial linkages.

4.2. Market timing ability

In Tables 6 to 10, we present the results of the market timing ability analysis for the excess bond return forecasts of all specification types considered. Hit ratios and statistical significance of the directional predictive ability of the competing models are shown for the same out-of-sample period of January 2010 to January 2019. A quick inspection of Tables 6 to 10 indicate several interesting results. First, the factor-augmented predictive regressions achieve hit ratios of between 0.52%-0.91%, 0.54%-0.85%, 0.61%-0.96%, 0.51%-0.86%, 0.38%-0.89%, respectively for Brazil, Indonesia, Mexico, South Africa and Turkey. Second, with a limited number of exceptions, all of the hit ratios of the factor-augmented models are significantly higher than those expected under independence according to the directional accuracy test.

Third, in general, the market timing ability of the factor-augmented models seems to be fairly stable over time, as the hit ratios for short- and long- forecast horizons are quite similar for short-term excess bond returns. However, the directional accuracy (DA) results show that the significance of the market timing ability diminishes slightly for the forecast horizons longer than 6-month-ahead. Fourth, including emerging market macro, financial, and global factors in the predictive regressions lead to improved market timing ability. This suggests that the factors extracted from pooled data sets across emerging markets contain additional information that is of relevance to market timing, relative to the historical mean benchmark and local factor model. Specifically, we see that the hit ratios of models that include emerging market factors improve more than 90% in the case of Brazil and Mexico. This confirms the superior ability of these models compared to the lack of market timing ability of the historical mean return. However, it is important to state that evaluating the hit ratios of the RW model is somewhat odd and the DA test results confirm this. In particular, the DA statistic cannot be even computed for all predictions of the random walk model, indicating that the RW model does not have any market timing ability. The reason is that only a small percentage of excess bond return forecasts from the RW model is negative, and hence, it is always optimal to invest in long-term bonds without trying to time the market.

Fifth, in essence, the market timing ability is enhanced by taking into account the specific target when constructing factors. Comparing the hit ratios and level of significance, it is seen that the performance of the specification types that use the PLS approach for extracting the factors is better than that of the PCA especially for Indonesia, Mexico, and Turkey.

– Insert Tables 6 to 10 about here. –

4.3. Assessing the economic value

In the previous section, we investigate the market timing ability of the factor-augmented predictive regressions using hit ratios. Although hit ratios provide some indication of model performances, as discussed, the superior market timing ability does not necessarily imply that investment strategies based on the excess return forecasts will be profitable. In order to assess the economic value explicitly, we compute the certainty equivalent return for a mean-variance investor who uses excess return forecasts to decide on weights of asset allocation.

Tables 11-12 report averages of Sharpe ratios and utility gain (annual percentage portfolio management) for all maturities across emerging markets for h-step ahead forecasts where h=1,2,3,6,9,12.[8] From the results in Table 11, we can say that asset allocation strategies based on the factor-augmented predictive regressions outperform those of the random walk model, with a few exceptions. This conclusion holds regardless of the forecast horizon. For instance, the portfolios based on the factor-augmented regressions achieve annualized Sharpe ratios in the range 0.44-0.97, compared to 0.22-0.52 for the benchmark model for Mexico. On the other hand, Sharpe ratios are based on portfolios constructed from the Local-PCA and EM Macro-PCA factor models are noticeably smaller when compared to benchmark model for Indonesia. This lower result in terms of Sharpe ratios is due to the overall weaker out-of-sample forecast performance of PCA based factor models in Indonesia. In general, the average of Sharpe ratios decrease with the forecast horizons. The reduction in Sharpe ratios is slightly less dramatic for PLS-based factor models. This confirms that the forecasts of PLS-based factor models are more stable compared to those of the PCA-based factor-augmented models.

– Insert Table 11 about here. –

[8]The results of Sharpe ratios and utlily gains for each maturities separately are presented in Tables B1-B5 and Table C1-C5 in the online appendix.

The results in Table 12 shows that the performance fees reveal a similar pattern. When the EM-macro-PLS model is considered, the performance fee aganist the benchmark portfolio drops on average from 88 to 41 basis points for Turkey. Put differently, investors, therefore will be willing to pay average performance fee up to 88 basis points annually to switch from the benchmark model to the emerging market macro-PLS model. This confirms the results of the previous sections, namely that the macroeconomic factors add relevant information concerning excess bond returns. However, an interesting observation from Table 12 is that the factor-augmented models generally have higher performance fees when the long-term forecast horizons are considered in case of Mexico. In particular, the performance fees range between 18.47-113.86 basis points for Mexico. Despite the overall success of our factor-augmented predictive regressions, the utility gains are slightly negative in certain cases for Indonesia and South Africa. A similar pattern can be observed when we consider results for Turkey, albeit in somewhat less pronounced manner.

– Insert Table 12 about here. –

Overall, the asset allocation exercise results seem to be compatible with the argument that substantial economic value can be achieved by combining information from cross-country macroeconomic and financial variables.

5. Conclusion

In this paper, we forecast the local currency debt of five major emerging market countries: Brazil, Indonesia, Mexico, South Africa, and Turkey, over the period of January 2010 to January 2019, based on an in-sample of March 2005 to December 2018. We exploit information from a large set of economic and financial time series to assess the importance of not only "own-country" factors (derived from principal component and partial least squares approach), but also create factors by combining the country-specific variables across the chosen emerging economies. These "Global" predictors, and its subsets of "Macroeconomic" and "Financial" factors, are then used individually to specify new factors, and are combined with the own-country factor model. To evaluate the forecasting performance of our models, we not only pursue the standard statistical approach based on prediction errors, but also undertake directional accuracy test required to devise profitable investment decisions, as well as, analyse the economic value of active trading strategies formed on the local currency bond risk premium forecasts using a utility-based metric.

We find that while information on own-country factors can outperform the historical average model, global factors tend to produce not only greater statistical and economic gains, but also enhances the market

timing ability of investors. In this regard, we also find that when factors are extracted based on the target variable of bond premium using the partial least squares, forecasting gains are higher relative to the case when the common predictors are derived from standard principal component analysis. In sum, our findings suggest that global investors should consider the cross-country linkages across emerging markets when forecasting the excess bond returns, as this will allow them to create optimal investment portfolios. In addition, our findings has important implications for policymakers as well, since information on not only own macroeconomic and financial variables (risks), but also that of other emerging countries, can be used to predict the future path of their local currency bond premium, and in the process reduce the probability of a sovereign debt crisis.

References

Akgiray, V., Baronyan, S., Sener, E., and Yilmaz, O. (2016). Predictability of emerging market local currency bond risk premia. Emerging Markets Finance and Trade, 52(7), 1627–1646.

Bai, J. (2010). Equity premium predictions with adaptive macro indexes. FRB of New York Staff Report, (475).

Bai, J., and Ng, S. (2002). Determining the number of factors in approximate factor models. Econometrica, 70(1), 191-221.

Bai, J., and Ng, S. (2008). Large dimensional factor analysis. Foundations and Trends in Econometrics, 3(2), 89-163.

Bianchi, D., Buchner, M., and Tamoni, A. (2019). Bond risk premia with machine learning. USC-INET Research Paper, (19-11).

Boivin, J., and Ng, S. (2006). Are more data always better for factor analysis?. Journal of Econometrics, 132(1), 169-194.

Buncic, D., and Tischhauser, M. (2017). Macroeconomic factors and equity premium predictability. International Review of Economics and Finance, 51, 621-644.

Bunda, I., Hamann, A.J., and Lall, S. (2009). Correlations in emerging market bonds: The role of local and global factors. Emerging Markets Review, 10(2), 67-96.

Campbell, J.Y. (2008). Viewpoint: estimating the equity premium, Canadian Journal of Economics, 41, 1–21.

Campbell, J.Y., and Shiller, R.J. (1991). Yield Spreads and Interest Rates: A Bird's Eye View. Review of Economic Studies, 58, 495–514.

Campbell, J.Y., and Thompson, S. B. (2008). Predicting excess stock returns out of sample: Can anything beat the historical average?. The Review of Financial Studies, 21(4), 1509-1531.

Çakmaklı, C., and van Dijk, D. (2016). Getting the most out of macroeconomic information for predicting excess stock returns. International Journal of Forecasting, 32(3), 650-668.

Cepni, O., Demirer, R., Gupta, R., and Pierdzioch, C. (Forthcoming a). Time-Varying Risk Aversion and the Predictability of Bond Premia. Finance Research Letters.

Cepni, O., Gul, S., and Gupta, R. (2019). Local currency bond risk premia of emerging markets: The role of local and global factors. Finance Research Letters. DOI: https://doi.org/10.1016/j.frl.2019.05.001.

Cepni, O., Gupta, R., Wohar, M.E. (Forthcoming b). Variants of Consumption-Wealth Ratios and Predictability of U.S. Government Bond Risk Premia. International Review of Finance.

Cepni, O., and Guney, I.E. (2019a). Local currency bond risk premia: A panel evidence on emerging markets. Emerging Markets Review, 38, 182-196.

Cepni, O., Guney, I. E., and Swanson, N. R. (2019b). Nowcasting and forecasting GDP in emerging markets using global financial and macroeconomic diffusion indexes. International Journal of Forecasting, 35(2), 555-572.

Clark, T. E., and West, K. D. (2007). Approximately normal tests for equal predictive accuracy in nested models. Journal of econometrics, 138(1), 291-311.

Cochrane, J.H., and Piazzesi, M. (2005). Bond risk premia. American Economic Review, 95(1), 138-160.

Diebold, F.X., and Li, C. (2006). Forecasting the term structure of government bond yields. Journal of Econometrics, 130(2), 337-364.

Fama, E. F., and Bliss. R.H. (1987). The Information in Long-Maturity Forward Rates. American Economic Review, 77, 680–692.

Fama, E.F., and French. K.R. (1989). Business Conditions and Expected Returns on Stocks and Bonds. Journal of Financial Economics, 25, 23–49.

Ferreira, M.A., and Santa-Clara, P. (2011). Forecasting stock market returns: The sum of the parts is more than the whole. Journal of Financial Economics, 100(3), 514-537.

Fleming, J., Kirby, C., and Ostdiek, B. (2001). The economic value of volatility timing. The Journal of Finance, 56(1), 329-352.

Friedman, J., Hastie, T., and Tibshirani, R. (2001). The elements of statistical learning (Vol. 1, No. 10). New York: Springer series in statistics.

Gadanecz, B., Miyajima, K., and Shu, C. (2018). Emerging market local currency sovereign bond yields: the role of exchange rate risk. International Review of Economics and Finance, 57, 371–401.

Gargano, A., Pettenuzzo, D., and Timmermann, A. (2019). Bond Return Predictability: Economic Value and Links to the Macroeconomy, Management Science, 65(2), 459-954.

Ghysels, E., Horan, C., and Moench, E. (2018). Forecasting through the Rear-view Mirror: Data Revisions and Bond Return Predictability. Review of Financial Studies, 31(2), 678–714.

Groen, J.J., and Kapetanios, G. (2016). Revisiting useful approaches to data-rich macroeconomic fore-

casting. Computational Statistics and Data Analysis, 100, 221-239.

International Monetary Fund. (2018). Recent Developments of Local Currency Bond Markets in Emerging Economies. IMF Staff Note for the G20 IFAWG.

Kelly, B., and Pruitt, S. (2015). The three-pass regression filter: A new approach to forecasting using many predictors. Journal of Econometrics, 186(2), 294-316.

Keim, D.B., and Stambaugh, R.F. (1986). Predicting Returns in the Stock and Bond Markets. Journal of Financial Economics, 17, 357–390.

Laborda, R. and Olmo, J. (2014). Investor sentiment and bond risk premia. Journal of Financial Markets, 18, 206-233.

Leitch, G., and Tanner, J.E. (1991). Economic forecast evaluation: profits versus the conventional error measures. The American Economic Review, 580-590.

Ludvigson, S.C., and Ng, S. (2009). Macro factors in bond risk premia. The Review of Financial Studies, 22(12), 5027-5067.

Ludvisgon, S.C., and Ng, S. (2011). A Factor Analysis of Bond Risk Premia. In A. Ulah, and D. Giles (eds.), Handbook of Empirical Economics and Finance, 313-372. London: Chapman and Hall.

Miyajima, K., Mohanty, M.S., Chan, T. (2015). Emerging market local currency bonds: diversification and stability. Emerging Markets Review, 22, 126–139.

Neely, C.J., Rapach, D.E., Tu, J., and Zhou, G. (2014). Forecasting the equity risk premium: the role of technical indicators. Management Science, 60(7), 1772-1791.

Pesaran, M.H., and Timmermann, A. (1995). Predictability of stock returns: Robustness and economic significance. The Journal of Finance, 50(4), 1201-1228.

Pesaran, M.H., and Timmermann, A. (1992). A simple nonparametric test of predictive performance. Journal of Business and Economic Statistics, 10(4), 461-465.

Pooter, M.D., Martens, M., and van Dijk, D. (2008). Predicting the daily covariance matrix for S&P 100 stocks using intraday data—but which frequency to use?. Econometric Reviews, 27(1-3), 199-229.

Stock, J.H., and Watson, M.W. (2002a). Forecasting using principal components from a large number of predictors. Journal of the American Statistical Association, 97(460), 1167-1179.

Stock, J.H., and Watson, M.W. (2002b). Macroeconomic forecasting using diffusion indexes. Journal of Business and Economic Statistics, 20(2), 147-162.

Subramaniam, S., and Prasanna, K. (2017). Yield curve interactions with the macroeconomic factors

during global financial crisis among Asian markets. International Review of Economics and Finance, 54(C), 178-192.

Subramaniam, S., Prasanna, K., and Bhaduri, S. (2016). Linkages in the term structure of interest rates across sovereign bond markets. Emerging Markets Review, 27, 118-139.

Welch, I., and Goyal, A. (2008). A Comprehensive Look at the Empirical Performance of Equity Premium Prediction. Review of Financial Studies 21(4), 1455–1508.

Wold, H., (1966). Estimation of principal component and related models by iterative least squares. In P. R. Krishnaiah (Ed.), Multivariate analysis, New York: Academic Press, 391–420.

Zhu, X. (2015). Out-of-sample bond risk premium predictions: A global common factor. Journal of International Money and Finance, 51, 155-173.

Table 1: Out-of-sample forecasting of excess bond returns based on alternative model specifications

Panel A: Brazil

$rx_{t+1}^{(2)}$	$h = 1$	$h = 2$	$h = 3$	$h = 6$	$h = 9$	$h = 12$
RW	2.66	2.69	2.73	2.81	2.86	2.88
Local – PCA	0.75***	0.84***	0.90***	1.01***	1.02***	1.03***
EMMacro – PCA	**0.66*****	**0.75*****	0.83***	0.96***	1.05***	1.10**
EMFinancial – PCA	0.70***	0.80***	0.87***	0.98***	1.01***	1.04***
EMGlobal – PCA	0.81***	0.89***	0.96***	1.05***	1.01***	1.01***
Local – PLS	0.82***	0.85***	0.86***	0.86***	0.89***	0.82***
EMMacro – PLS	0.79***	0.82***	0.84***	0.83***	0.85***	**0.82*****
EMFinancial – PLS	0.77***	0.81***	0.83***	0.84***	0.89***	0.88***
EMGlobal – PLS	0.77***	0.79***	**0.82*****	**0.82*****	**0.85*****	0.83***
$rx_{t+1}^{(3)}$						
RW	5.34	5.41	5.47	5.62	5.70	5.71
Local – PCA	0.72***	0.80***	0.86***	0.97***	0.98***	0.97***
EMMacro – PCA	**0.60*****	**0.71*****	**0.79*****	0.92***	1.03***	1.14***
EMFinancial – PCA	0.70***	0.79***	0.86***	0.98***	1.02***	1.04***
EMGlobal – PCA	0.77***	0.85***	0.92 ***	1.00***	0.98***	0.96***
Local – PLS	0.82***	0.85***	0.87***	0.87***	0.87***	0.86***
EMMacro – PLS	0.79***	0.82***	0.83***	0.84***	0.86***	0.88***
EMFinancial – PLS	0.74***	0.78***	0.80***	0.82***	**0.85*****	0.87***
EMGlobal – PLS	0.80***	0.83***	0.80***	**0.76*****	0.86***	**0.85*****
$rx_{t+1}^{(4)}$						
RW	7.67	7.76	7.85	8.06	8.15	8.13
Local – PCA	0.77***	0.84***	0.91***	1.02***	1.03***	1.00***
EMMacro – PCA	**0.57*****	**0.67*****	**0.74*****	0.91***	1.07***	1.18***
EMFinancial – PCA	0.74***	0.83***	0.90***	1.05***	1.11***	1.12***
EMGlobal – PCA	0.80***	0.89***	0.96***	1.06***	1.05***	1.00***
Local – PLS	0.86***	0.88***	0.89***	0.89***	0.88***	0.91**
EMMacro – PLS	0.82***	0.85***	0.86***	0.86***	0.87***	0.92**
EMFinancial – PLS	0.77***	0.80***	0.82***	0.83***	0.84***	0.90**
EMGlobal – PLS	0.78***	0.81***	0.81***	**0.80*****	**0.82*****	**0.87*****
$rx_{t+1}^{(5)}$						
RW	10.50	10.62	10.73	11.00	11.14	11.10
Local – PCA	0.77***	0.85***	0.93***	1.06***	1.08***	1.05***
EMMacro – PCA	**0.55*****	**0.64*****	**0.73*****	0.93***	1.09***	1.16***
EMFinancial – PCA	0.94***	0.96***	0.99***	1.04	1.05	1.04
EMGlobal – PCA	0.69***	0.79***	0.89***	1.07***	1.15***	1.20***
Local – PLS	0.86***	0.88***	0.89***	0.89***	0.89***	0.93*
EMMacro – PLS	0.78***	0.83***	0.85***	0.87***	0.87***	**0.88*****
EMFinancial – PLS	0.77***	0.80***	0.82***	0.82***	0.85***	0.92**
EMGlobal – PLS	0.78***	0.81***	0.82***	**0.81*****	**0.84*****	0.91***

Note: Entries in the first row of the table are point MSFEs based on the benchmark random walk (RW) model, while the rest are relative MSFEs. Hence, a value of less than unity indicates that a particular model and estimation method is more accurate than that based on the RW model, for a given forecast horizon. Models that yield the lowest MSFE for each forecast horizon are denoted in bold. Entries superscripted with an asterisk (*** = 1% level; ** = 5% level; * = 10% level) are significantly superior than the RW model, based on the Clark and West (2007) predictive accuracy test.

Table 2: Out-of-sample forecasting of excess bond returns based on alternative model specifications

Panel B: Indonesia

$rx_{t+1}^{(2)}$	$h = 1$	$h = 2$	$h = 3$	$h = 6$	$h = 9$	$h = 12$
RW	1.81	1.83	1.84	1.89	1.96	2.01
Local – PCA	1.15	1.13	1.13	1.13	1.12	1.12
EMMacro – PCA	1.09	1.08	1.09	1.10	1.10	1.10
EMFinancial – PCA	0.97***	1.03***	1.09***	1.07***	1.11*	1.13
EMGlobal – PCA	1.06	1.06	1.06	1.07	1.07	1.07
Local – PLS	0.73***	0.75***	0.77***	0.82***	0.92***	1.00**
EMMacro – PLS	0.72***	0.75***	0.77***	**0.80****	0.91***	1.00***
EMFinancial – PLS	0.81***	0.86***	0.89***	0.99***	1.13*	1.29
EMGlobal – PLS	**0.71****	**0.75****	**0.76****	0.80***	**0.91****	**1.00****
$rx_{t+1}^{(3)}$						
RW	3.62	3.65	3.68	3.79	3.94	4.08
Local – PCA	1.16	1.15	1.14	1.12	1.11	1.11
EMMacro – PCA	1.12***	1.12***	1.12***	1.10***	1.09**	1.08**
EMFinancial – PCA	0.98***	1.02***	1.07***	1.07***	1.10**	1.10**
EMGlobal – PCA	**0.69****	0.79***	0.90***	1.07***	1.26***	1.23***
Local – PLS	0.73***	**0.76****	**0.79****	0.86***	0.97***	1.06
EMMacro – PLS	0.80***	0.82***	0.85***	**0.86****	**0.88****	**0.89****
EMFinancial – PLS	0.83***	0.88***	0.93***	1.03***	1.17*	1.31
EMGlobal – PLS	0.80***	0.82***	0.85***	0.86***	0.88***	0.89***
$rx_{t+1}^{(4)}$						
RW	5.38	5.43	5.47	5.64	5.88	6.12
Local – PCA	1.14	1.13	1.13	1.11	1.10	1.09
EMMacro – PCA	1.11	1.11	1.11	1.09	1.08	1.07
EMFinancial – PCA	0.97***	1.01***	1.05***	1.06***	1.08***	1.07***
EMGlobal – PCA	**0.69****	0.78***	0.88***	1.09***	1.28***	1.22***
Local – PLS	0.72***	**0.76****	**0.78****	0.87***	0.98***	1.06*
EMMacro – PLS	0.79***	0.81***	0.83***	**0.84****	**0.86****	**0.87****
EMFinancial – PLS	0.82***	0.87***	0.91***	1.01***	1.14*	1.27
EMGlobal – PLS	0.79***	0.81***	0.83***	0.84***	0.86***	0.87***
$rx_{t+1}^{(5)}$						
RW	6.90	6.97	7.02	7.24	7.57	7.89
Local – PCA	1.15	1.13	1.13	1.11	1.09	1.08
EMMacro – PCA	1.12	1.11	1.12	1.09	1.08	1.06
EMFinancial – PCA	0.97***	1.01***	1.05***	1.07***	1.08***	1.07**
EMGlobal – PCA	1.10	1.10	1.10	1.09	1.08	1.07
Local – PLS	0.89***	0.90***	0.92***	0.91***	0.91***	0.88***
EMMacro – PLS	**0.79****	**0.81****	**0.84****	**0.83****	**0.86****	**0.86****
EMFinancial – PLS	0.80***	0.85***	0.89***	1.00***	1.13**	1.26
EMGlobal – PLS	0.79***	0.81***	0.84***	0.83***	0.86***	0.86***

Note: See notes to Table 1.

Table 3: Out-of-sample forecasting of excess bond returns based on alternative model specifications

Panel C: Mexico

$rx_{t+1}^{(2)}$	$h = 1$	$h = 2$	$h = 3$	$h = 6$	$h = 9$	$h = 12$
RW	1.07	1.09	1.11	1.18	1.25	1.32
Local – PCA	0.86***	0.90***	0.93***	0.92***	0.81***	0.70***
EMMacro – PCA	0.71***	0.72***	0.74***	0.77***	0.79***	0.80***
EMFinancial – PCA	0.82***	0.87***	0.91***	0.86***	0.76***	0.84***
EMGlobal – PCA	0.77***	0.79***	0.80***	0.83***	0.84***	0.84***
Local – PLS	0.69***	0.70***	0.70***	0.71***	0.70***	0.71***
EMMacro – PLS	0.68***	0.69***	0.68***	0.67***	0.64***	0.64***
EMFinancial – PLS	**0.67****	**0.68****	**0.68****	0.70***	0.69***	0.68***
EMGlobal – PLS	0.68***	0.68***	0.68***	**0.67****	**0.64****	**0.64****
$rx_{t+1}^{(3)}$						
RW	2.00	2.02	2.06	2.20	2.37	2.52
Local – PCA	0.92***	0.96***	1.00***	1.00***	0.91***	0.83***
EMMacro – PCA	**0.62****	**0.65****	**0.67****	**0.67****	**0.63****	**0.61****
EMFinancial – PCA	0.90***	0.98***	1.02***	0.94***	0.74***	0.74***
EMGlobal – PCA	0.73***	0.75***	0.77***	0.80***	0.79***	0.79***
Local – PLS	0.76***	0.75***	0.75***	0.75***	0.73***	0.74***
EMMacro – PLS	0.73***	0.72***	0.72***	0.70***	0.66***	0.67***
EMFinancial – PLS	0.74***	0.75***	0.75***	0.75***	0.70***	0.68***
EMGlobal – PLS	0.69***	0.70***	0.73***	0.70***	0.66***	0.63***
$rx_{t+1}^{(4)}$						
RW	2.63	2.66	2.70	2.90	3.12	3.35
Local – PCA	0.83***	0.88***	0.89***	0.87***	0.93***	1.15***
EMMacro – PCA	**0.71****	0.75***	0.78***	0.79***	0.72***	0.65***
EMFinancial – PCA	0.90***	0.97***	1.01***	0.97***	0.80***	0.85***
EMGlobal – PCA	0.77***	0.82***	0.86***	0.89***	0.85***	0.81***
Local – PLS	0.77***	0.77***	0.77***	0.76***	0.73***	0.74***
EMMacro – PLS	0.74***	0.74***	0.74***	0.71***	0.66***	**0.65****
EMFinancial – PLS	0.76***	0.77***	0.77***	0.77***	0.73***	0.74***
EMGlobal – PLS	0.72***	**0.72****	**0.72****	**0.69****	**0.65****	0.66***
$rx_{t+1}^{(5)}$						
RW	3.35	3.39	3.44	3.67	3.96	4.25
Local – PCA	0.86***	0.92***	0.94***	0.90***	0.87***	1.02***
EMMacro – PCA	0.79***	0.85***	0.89***	0.91***	0.82***	**0.71****
EMFinancial – PCA	0.98***	0.98***	0.98***	0.98***	0.97***	0.96***
EMGlobal – PCA	0.87***	0.89***	0.89***	0.90***	0.89***	0.89***
Local – PLS	0.80***	0.80***	0.80***	0.79***	0.75***	0.74***
EMMacro – PLS	0.73***	0.73***	0.75***	0.74***	0.72***	0.74***
EMFinancial – PLS	0.83***	0.84***	0.85***	0.84***	0.80***	0.79***
EMGlobal – PLS	**0.71****	**0.71****	**0.73****	**0.70****	**0.69****	0.75***

Note: See notes to Table 1.

Table 4: Out-of-sample forecasting of excess bond returns based on alternative model specifications

Panel D: South Africa

$rx_{t+1}^{(2)}$	$h = 1$	$h = 2$	$h = 3$	$h = 6$	$h = 9$	$h = 12$
RW	0.82	0.83	0.83	0.84	0.85	0.86
Local – PCA	**0.72*****	**0.76*****	**0.79*****	0.97***	1.09***	1.16***
EMMacro – PCA	0.80***	0.85***	0.89***	1.02***	1.18***	1.34***
EMFinancial – PCA	0.99***	1.00**	1.00**	1.02*	1.03	1.03
EMGlobal – PCA	1.01***	1.03***	1.03**	1.06	1.08	1.04
Local – PLS	0.95***	0.96***	0.96***	**0.95*****	**0.95*****	**0.98*****
EMMacro – PLS	1.03***	1.04***	1.04***	1.01**	1.04*	1.05
EMFinancial – PLS	1.02**	1.03**	1.03**	1.03**	1.03*	1.09
EMGlobal – PLS	0.91***	0.89***	0.91***	1.02***	0.98***	0.99***
$rx_{t+1}^{(3)}$						
RW	2.05	2.05	2.05	2.06	2.07	2.06
Local – PCA	**0.60*****	**0.66*****	**0.71*****	0.86***	0.94***	1.00***
EMMacro – PCA	0.75***	0.80***	0.83***	0.96***	1.08***	1.09***
EMFinancial – PCA	0.99***	1.00**	1.01**	1.04	1.06	1.06
EMGlobal – PCA	0.99***	1.00***	1.01***	1.07	1.10	1.07
Local – PLS	0.92***	0.94***	0.96***	0.96***	0.93***	**0.99****
EMMacro – PLS	0.95***	1.00**	1.02*	1.08*	1.03**	1.05
EMFinancial – PLS	0.94***	0.96***	0.96***	0.97***	0.98***	1.15**
EMGlobal – PLS	0.89***	0.88***	0.87***	**0.85*****	**0.86*****	1.00**
$rx_{t+1}^{(4)}$						
RW	3.57	3.57	3.58	3.59	3.61	3.58
Local – PCA	**0.63*****	**0.72*****	**0.79*****	1.01***	1.05***	1.03***
EMMacro – PCA	0.69***	0.76***	0.81***	**0.93*****	0.99***	**0.97*****
EMFinancial – PCA	0.97***	0.98**	0.99**	1.02	1.04	1.04
EMGlobal – PCA	0.76***	0.83***	0.88***	1.05***	1.12***	1.12***
Local – PLS	0.92***	0.95***	0.98***	0.94***	**0.91*****	1.03
EMMacro – PLS	1.01***	1.03***	1.02***	1.04***	1.03***	1.09***
EMFinancial – PLS	1.00**	1.00**	1.00**	1.01**	1.02	1.07
EMGlobal – PLS	0.93***	0.94***	0.94***	0.97***	0.98**	1.10
$rx_{t+1}^{(5)}$						
RW	4.63	4.65	4.68	4.75	4.80	4.77
Local – PCA	0.97***	0.98***	0.98**	1.00*	1.01	1.01
EMMacro – PCA	**0.73*****	**0.80*****	**0.85*****	0.96***	1.02***	**1.00*****
EMFinancial – PCA	0.98***	0.99**	1.00**	1.02	1.03	1.03
EMGlobal – PCA	0.85***	0.90***	0.93***	1.05***	1.09***	1.04***
Local – PLS	0.98***	0.99***	0.99**	1.00	1.01	1.01
EMMacro – PLS	0.92***	0.97***	0.95***	0.96***	1.02***	1.10***
EMFinancial – PLS	0.97***	0.98***	0.98***	0.99***	1.01*	1.04
EMGlobal – PLS	0.90***	0.90***	0.90***	**0.92*****	**0.94*****	1.06

Note: See notes to Table 1.

Table 5: Out-of-sample forecasting of excess bond returns based on alternative model specifications

Panel E: Turkey

$rx_{t+1}^{(2)}$	$h = 1$	$h = 2$	$h = 3$	$h = 6$	$h = 9$	$h = 12$
RW	2.96	3.00	3.05	3.42	4.29	4.49
Local – PCA	0.76***	0.84***	0.90***	0.92***	0.96***	1.02***
EMMacro – PCA	0.88***	0.92***	0.95***	0.97***	0.96***	0.99***
EMFinancial – PCA	0.83***	0.90***	0.97***	1.00***	1.02***	1.08***
EMGlobal – PCA	0.89***	0.89***	0.90***	0.89***	0.89***	0.93***
Local – PLS	0.58***	0.59***	0.60***	0.58***	0.58***	0.71***
EMMacro – PLS	**0.48****	**0.51****	**0.53****	**0.54****	0.55***	0.68***
EMFinancia – PLS	0.54***	0.56***	0.57***	0.55***	**0.47****	**0.62****
EMGlobal – PLS	0.57***	0.60***	0.61***	0.58***	0.54***	0.68***
$rx_{t+1}^{(3)}$						
RW	4.73	4.79	4.87	5.65	7.59	7.90
Local – PCA	0.84***	0.91***	0.99***	0.97***	1.00***	1.05***
EMMacro – PCA	1.03***	1.04***	1.04***	1.01***	0.98***	1.01***
EMFinancial – PCA	0.88***	0.97***	1.04***	1.07***	1.05***	1.11***
EMGlobal – PCA	1.00***	1.00***	1.00***	0.97***	0.95***	0.98***
Local – PLS	0.59***	0.60***	0.61***	0.57***	0.57***	0.72***
EMMacro – PLS	0.57***	0.59***	0.61***	0.60***	0.60***	0.74***
EMFinancial – PLS	**0.54****	**0.55****	**0.56****	**0.50****	**0.45****	**0.60****
EMGlobal – PLS	0.61***	0.63***	0.65***	0.59***	0.52***	0.70***
$rx_{t+1}^{(4)}$						
RW	6.07	6.15	6.24	7.44	10.27	10.66
Local – PCA	0.94***	1.00***	1.06***	1.02***	1.02***	1.06***
EMMacro – PCA	1.10***	1.11***	1.11***	1.05***	1.01***	1.03**
EMFinancial – PCA	1.09***	1.10***	1.11***	1.11***	1.08***	1.11**
EMGlobal – PCA	1.12***	1.11***	1.11***	1.04***	1.00***	1.03***
Local – PLS	0.59***	0.60***	0.60***	0.56***	0.55***	0.70***
EMMacro – PLS	0.60***	0.63***	0.65***	0.63***	0.61***	0.75***
EMFinancial – PLS	**0.54****	**0.55****	**0.54****	**0.45****	**0.43****	**0.58****
EMGlobal – PLS	0.63***	0.65***	0.67***	0.58***	0.50***	0.70***
$rx_{t+1}^{(5)}$						
RW	7.42	7.52	7.63	9.09	12.75	13.14
Local – PCA	0.98***	1.05***	1.11***	1.06***	1.05***	1.09***
EMMacro – PCA	1.11***	1.12***	1.11***	1.06***	1.01***	1.04**
EMFinancial – PCA	1.07***	1.08***	1.09***	1.09***	1.07***	1.10**
EMGlobal – PCA	1.16***	1.15***	1.14***	1.08***	1.02***	1.05***
Local – PLS	0.58***	0.60***	0.60***	0.55***	0.53***	0.68***
EMMacro – PLS	0.61***	0.64***	0.66***	0.63***	0.59***	0.73***
EMFinancial – PLS	**0.54****	**0.56****	**0.57****	**0.48****	**0.41****	**0.59****
EMGlobal – PLS	0.61***	0.63***	0.64***	0.56***	0.48***	0.69***

Note: See notes to Table 1.

Table 6: Market timing abilities of the monthly excess bond return forecasts

Panel A: Brazil

$rx_{t+1}^{(2)}$	$h = 1$	$h = 2$	$h = 3$	$h = 6$	$h = 9$	$h = 12$
RW	0.62^{NA}	0.62^{NA}	0.62^{NA}	0.62^{NA}	0.62^{NA}	0.62^{NA}
Local – PCA	0.81***	0.82***	0.80***	0.73***	0.71***	0.67***
EMMacro – PCA	0.81***	0.79***	0.79***	0.71***	0.64*	0.61
EMFinancial – PCA	0.79***	0.73***	0.68***	0.68***	0.67***	0.68***
EMGlobal – PCA	0.86***	0.86***	0.86***	0.84***	0.78***	0.78***
Local – PLS	0.67***	0.67***	0.69***	0.72***	0.75***	0.69***
EMMacro – PLS	0.76***	0.76***	0.81***	0.80***	0.81***	0.76***
EMFinancial – PLS	0.85***	0.82***	0.84***	0.81***	0.74***	0.72***
EMGlobal – PLS	0.76***	0.75***	0.79***	0.79***	0.84***	0.74***
$rx_{t+1}^{(3)}$						
RW	0.64^{NA}	0.64^{NA}	0.64^{NA}	0.64^{NA}	0.64^{NA}	0.64^{NA}
Local – PCA	0.79***	0.78***	0.75***	0.73***	0.69***	0.73***
EMMacro – PCA	0.87***	0.84***	0.84***	0.81***	0.79***	0.64*
EMFinancial – PCA	0.73***	0.69***	0.66**	0.68***	0.67***	0.66**
EMGlobal – PCA	0.86***	0.86***	0.86***	0.85***	0.82***	0.75***
Local – PLS	0.68***	0.68***	0.68***	0.66**	0.71***	0.71***
EMMacro – PLS	0.78***	0.78***	0.75***	0.78***	0.74***	0.68***
EMFinancial – PLS	0.76***	0.78***	0.78***	0.76***	0.72***	0.71***
EMGlobal – PLS	0.78***	0.76***	0.79***	0.79***	0.78***	0.79***
$rx_{t+1}^{(4)}$						
RW	0.67^{NA}	0.67^{NA}	0.67^{NA}	0.67^{NA}	0.68^{NA}	0.68^{NA}
Local – PCA	0.80***	0.79***	0.72***	0.64	0.64	0.62
EMMacro – PCA	0.91***	0.91***	0.89***	0.81***	0.69***	0.62
EMFinancial – PCA	0.73***	0.67**	0.65	0.52	0.58	0.61
EMGlobal – PCA	0.91***	0.85***	0.84***	0.75***	0.74***	0.73***
Local – PLS	0.72***	0.68**	0.69**	0.69**	0.67**	0.71**
EMMacro – PLS	0.73***	0.74***	0.71***	0.68***	0.68***	0.67**
EMFinancial – PLS	0.73	0.71	0.71	0.75	0.74	0.72
EMGlobal – PLS	0.73***	0.72***	0.74***	0.76***	0.78***	0.73***
$rx_{t+1}^{(5)}$						
RW	0.67^{NA}	0.67^{NA}	0.67^{NA}	0.67^{NA}	0.67^{NA}	0.67^{NA}
Local – PCA	0.81***	0.76***	0.74***	0.66	0.61	0.61
EMMacro – PCA	0.89***	0.87***	0.85***	0.79***	0.64**	0.61
EMFinancial – PCA	0.61	0.59	0.58	0.58	0.54	0.55
EMGlobal – PCA	0.81***	0.74***	0.73***	0.69***	0.72***	0.69***
Local – PLS	0.71***	0.69**	0.67*	0.66	0.64	0.66
EMMacro – PLS	0.76***	0.72***	0.68***	0.68***	0.66**	0.67***
EMFinancial – PLS	0.71***	0.72***	0.66***	0.74***	0.68**	0.68**
EMGlobal – PLS	0.73***	0.72***	0.74***	0.73***	0.71***	0.67**

Note: The table presents the market timing abilities of the different model specifications that are defined in Section 3.3. Entries are the proportions of signs predicted correctly. Entries superscripted with an asterisk (*** = 1% level; ** = 5% level; * = 1% level) are significantly superior market timing ability than the benchmark RW model, based on the directional accuracy test of Pesaran and Timmermann (1992) as defined in Eq.(7). NA indicates that the test could not be computed.

Table 7: Market timing abilities of the monthly excess bond return forecasts

Panel B: Indonesia

$rx_{t+1}^{(2)}$	$h = 1$	$h = 2$	$h = 3$	$h = 6$	$h = 9$	$h = 12$
RW	0.75^{NA}	0.75^{NA}	0.75^{NA}	0.75^{NA}	0.73^{NA}	0.69^{NA}
Local – PCA	0.72	0.73	0.74	0.75	0.73	0.69
EMMacro – PCA	0.72	0.73	0.73	0.75	0.73	0.69
EMFinancial – PCA	0.72	0.71	0.71	0.69	0.68	0.67
EMGlobal – PCA	0.72	0.73	0.74	0.75	0.73	0.69
Local – PLS	0.81***	0.79***	0.79***	0.81***	0.74**	0.68
EMMacro – PLS	0.80***	0.78***	0.80***	0.81***	0.74***	0.71**
EMFinancial – PLS	0.79***	0.78***	0.75***	0.72	0.72	0.69
EMGlobal – PLS	0.82***	0.80***	0.79***	0.82***	0.75***	0.68
$rx_{t+1}^{(3)}$						
RW	0.73^{NA}	0.73^{NA}	0.73^{NA}	0.72^{NA}	0.68^{NA}	0.65^{NA}
Local – PCA	0.69	0.69	0.71	0.71	0.68	0.65
EMMacro – PCA	0.69	0.68	0.68	0.58	0.55	0.55
EMFinancial – PCA	0.69	0.68	0.68	0.58	0.55	0.55
EMGlobal – PCA	0.82***	0.81***	0.81***	0.81***	0.81***	0.80***
Local – PLS	0.84***	0.84***	0.82***	0.78***	0.71**	0.66
EMMacro – PLS	0.79***	0.78***	0.76***	0.75***	0.69**	0.66*
EMFinancial – PLS	0.79***	0.76***	0.73**	0.66	0.66	0.64
EMGlobal – PLS	0.79***	0.78***	0.76***	0.76***	0.68*	0.66*
$rx_{t+1}^{(4)}$						
RW	0.72^{NA}	0.72^{NA}	0.72^{NA}	0.69^{NA}	0.66^{NA}	0.62^{NA}
Local – PCA	0.68	0.68	0.69	0.68	0.66	0.62
EMMacro – PCA	0.67	0.68	0.68	0.68	0.66	0.62
EMFinancial – PCA	0.68	0.67	0.64	0.54	0.54	0.59
EMGlobal – PCA	0.81***	0.82***	0.82***	0.79***	0.79***	0.78***
Local – PLS	0.85***	0.84***	0.82***	0.78***	0.69**	0.65*
EMMacro – PLS	0.79***	0.79***	0.76***	0.74***	0.65	0.65**
EMFinancial – PLS	0.78***	0.78***	0.74***	0.67	0.71***	0.64*
EMGlobal – PLS	0.79***	0.79***	0.76***	0.74***	0.65	0.65**
$rx_{t+1}^{(5)}$						
RW	0.72^{NA}	0.72^{NA}	0.72^{NA}	0.69^{NA}	0.66^{NA}	0.62^{NA}
Local – PCA	0.67	0.68	0.68	0.68	0.66	0.62
EMMacro – PCA	0.67	0.67	0.68	0.67	0.64	0.62
EMFinancial – PCA	0.71	0.69	0.66	0.58	0.54	0.60
EMGlobal – PCA	0.67	0.68	0.69	0.68	0.66	0.62
Local – PLS	0.74**	0.72	0.74**	0.71*	0.66	0.65*
EMMacro – PLS	0.76***	0.75***	0.78***	0.75***	0.66**	0.66**
EMFinancial – PLS	0.84***	0.78***	0.76***	0.69**	0.69**	0.62
EMGlobal – PLS	0.78***	0.75***	0.78***	0.75***	0.66**	0.67***

Note: See notes to Table 6.

Table 8: Market timing abilities of the monthly excess bond return forecasts

Panel C: Mexico

$rx_{t+1}^{(2)}$	$h = 1$	$h = 2$	$h = 3$	$h = 6$	$h = 9$	$h = 12$
RW	0.79^{NA}	0.78^{NA}	0.76^{NA}	0.73^{NA}	0.69^{NA}	0.66^{NA}
Local – PCA	0.84***	0.84***	0.84***	0.84***	0.86***	0.88***
EMMacro – PCA	0.93***	0.87***	0.81***	0.78***	0.68	0.61
EMFinancial – PCA	0.88***	0.88***	0.86***	0.86***	0.86***	0.79***
EMGlobal – PCA	0.84***	0.81***	0.82***	0.78***	0.71*	0.66
Local – PLS	0.92***	0.92***	0.93***	0.92***	0.92***	0.91***
EMMacro – PLS	0.88***	0.88***	0.88***	0.88***	0.88***	0.87***
EMFinancial – PLS	0.93***	0.94***	0.94***	0.93***	0.92***	0.91***
EMGlobal – PLS	0.88***	0.88***	0.88***	0.88***	0.88***	0.87***
$rx_{t+1}^{(3)}$						
RW	0.80^{NA}	0.79^{NA}	0.78^{NA}	0.74^{NA}	0.71^{NA}	0.67^{NA}
Local – PCA	0.87***	0.86***	0.86***	0.85***	0.82***	0.79***
EMMacro – PCA	0.96***	0.96***	0.95***	0.89***	0.85***	0.79***
EMFinancial – PCA	0.87***	0.88***	0.86***	0.86***	0.86***	0.84***
EMGlobal – PCA	0.86***	0.85***	0.85***	0.82***	0.81***	0.79***
Local – PLS	0.94***	0.94***	0.95***	0.94***	0.93***	0.92***
EMMacro – PLS	0.92***	0.92***	0.92***	0.93***	0.91***	0.91***
EMFinancial – PLS	0.96***	0.95***	0.93***	0.91***	0.91***	0.89***
EMGlobal – PLS	0.92***	0.91***	0.91***	0.91***	0.91***	0.87***
$rx_{t+1}^{(4)}$						
RW	0.82^{NA}	0.81^{NA}	0.80^{NA}	0.76^{NA}	0.73^{NA}	0.69^{NA}
Local – PCA	0.75**	0.74**	0.73**	0.73**	0.72**	0.76***
EMMacro – PCA	0.95***	0.95***	0.95***	0.89***	0.86***	0.84***
EMFinancial – PCA	0.81***	0.81***	0.81***	0.81***	0.84***	0.80***
EMGlobal – PCA	0.89***	0.86***	0.86***	0.85***	0.82***	0.82***
Local – PLS	0.92***	0.93***	0.94***	0.94***	0.94***	0.94***
EMMacro – PLS	0.92***	0.91***	0.92***	0.92***	0.92***	0.91***
EMFinancial – PLS	0.95***	0.95***	0.96***	0.96***	0.96***	0.95***
EMGlobal – PLS	0.92***	0.92***	0.92***	0.92***	0.92***	0.91***
$rx_{t+1}^{(5)}$						
RW	0.77^{NA}	0.76^{NA}	0.75^{NA}	0.71^{NA}	0.68^{NA}	0.64^{NA}
Local – PCA	0.73**	0.71*	0.71**	0.75***	0.74***	0.74***
EMMacro – PCA	0.92***	0.92***	0.87***	0.84***	0.81***	0.81***
EMFinancial – PCA	0.78^{NA}	0.76^{NA}	0.75^{NA}	0.72^{NA}	0.68^{NA}	0.65^{NA}
EMGlobal – PCA	0.78^{NA}	0.76^{NA}	0.75^{NA}	0.72^{NA}	0.68^{NA}	0.65^{NA}
Local – PLS	0.95***	0.95***	0.95***	0.93***	0.92***	0.91***
EMMacro – PLS	0.87***	0.87***	0.87***	0.87***	0.88***	0.89***
EMFinancial – PLS	0.92***	0.92***	0.92***	0.91***	0.91***	0.89***
EMGlobal – PLS	0.89***	0.88***	0.88***	0.89***	0.88***	0.88***

Note: See notes to Table 6.

Table 9: Market timing abilities of the monthly excess bond return forecasts

Panel D: South Africa

$rx_{t+1}^{(2)}$	$h = 1$	$h = 2$	$h = 3$	$h = 6$	$h = 9$	$h = 12$
RW	0.80^{NA}	0.80^{NA}	0.80^{NA}	0.79^{NA}	0.76^{NA}	0.76^{NA}
Local – PCA	0.85***	0.80*	0.79*	0.78***	0.71	0.72
EMMacro – PCA	0.84***	0.80***	0.78***	0.79***	0.73**	0.67
EMFinancial – PCA	0.80	0.80	0.80	0.79	0.76	0.76
EMGlobal – PCA	0.80	0.80	0.80	0.79	0.76	0.76
Local – PLS	0.69	0.69	0.69	0.72	0.72	0.71
EMMacro – PLS	0.74	0.75	0.74	0.79*	0.72	0.68
EMFinancial – PLS	0.78	0.78	0.79	0.76	0.74	0.72
EMGlobal – PLS	0.73*	0.74**	0.74**	0.76***	0.75***	0.75**
$rx_{t+1}^{(3)}$						
RW	0.78^{NA}	0.78^{NA}	0.78^{NA}	0.76^{NA}	0.74^{NA}	0.74^{NA}
Local – PCA	0.82***	0.82***	0.82***	0.73***	0.73**	0.74**
EMMacro – PCA	0.80***	0.80***	0.79***	0.72***	0.71**	0.72***
EMFinancial – PCA	0.78	0.78	0.78	0.76	0.74	0.74
EMGlobal – PCA	0.76	0.78	0.78	0.76	0.73	0.74
Local – PLS	0.79***	0.76***	0.75**	0.71	0.71*	0.66
EMMacro – PLS	0.76***	0.72**	0.72**	0.65	0.68	0.68**
EMFinancial – PLS	0.86***	0.85***	0.86***	0.85***	0.82***	0.73***
EMGlobal – PLS	0.82***	0.80***	0.80***	0.84***	0.80***	0.72**
$rx_{t+1}^{(4)}$						
RW	0.75^{NA}	0.75^{NA}	0.75^{NA}	0.73^{NA}	0.71^{NA}	0.71^{NA}
Local – PCA	0.82***	0.81***	0.81***	0.66	0.61	0.61
EMMacro – PCA	0.79***	0.79***	0.75***	0.69	0.65	0.69*
EMFinancial – PCA	0.75	0.75	0.75	0.73	0.71	0.71
EMGlobal – PCA	0.78***	0.76***	0.75**	0.67	0.61	0.65
Local – PLS	0.74**	0.75***	0.69	0.71**	0.73***	0.60
EMMacro – PLS	0.73***	0.69***	0.69***	0.73***	0.69***	0.68**
EMFinancial – PLS	0.69	0.69	0.68	0.69	0.68	0.65
EMGlobal – PLS	0.69**	0.71***	0.74***	0.64*	0.56	0.48
$rx_{t+1}^{(5)}$						
RW	0.68	0.68	0.68	0.69	0.71***	0.65
Local – PCA	0.73^{NA}	0.73^{NA}	0.73^{NA}	0.71^{NA}	0.67^{NA}	0.67^{NA}
EMMacro – PCA	0.80***	0.78***	0.74***	0.68	0.64	0.69**
EMFinancial – PCA	0.73	0.73	0.73	0.69	0.64	0.64
EMGlobal – PCA	0.72***	0.71**	0.68**	0.56	0.52	0.56
Local – PLS	0.61	0.58	0.56	0.54	0.48	0.51
EMMacro – PLS	0.73***	0.72***	0.72***	0.74***	0.72***	0.65
EMFinancial – PLS	0.64	0.62	0.61	0.61	0.62	0.59
EMGlobal – PLS	0.73***	0.75***	0.74***	0.68**	0.65**	0.51

Note: See notes to Table 6.

Table 10: Market timing abilities of the monthly excess bond return forecasts

Panel E: Turkey

$rx_{t+1}^{(2)}$	$h = 1$	$h = 2$	$h = 3$	$h = 6$	$h = 9$	$h = 12$
RW	0.47^{NA}	0.46^{NA}	0.45^{NA}	0.41^{NA}	0.38^{NA}	0.36^{NA}
Local – PCA	0.66***	0.62***	0.61***	0.60***	0.58***	0.56***
EMMacro – PCA	0.67***	0.66***	0.62***	0.56*	0.54*	0.52
EMFinancial – PCA	0.66***	0.64***	0.61**	0.59*	0.54	0.52
EMGlobal – PCA	0.53	0.52	0.51	0.42	0.44	0.42
Local – PLS	0.78***	0.78***	0.79***	0.73***	0.74***	0.65***
EMMacro – PLS	0.87***	0.82***	0.78***	0.82***	0.76***	0.73***
EMFinancial – PLS	0.79***	0.75***	0.74***	0.74***	0.78***	0.74***
EMGlobal – PLS	0.80***	0.78***	0.76***	0.75***	0.74***	0.66***
$rx_{t+1}^{(3)}$						
RW	0.47^{NA}	0.46^{NA}	0.45^{NA}	0.41^{NA}	0.38^{NA}	0.36^{NA}
Local – PCA	0.69***	0.65***	0.60**	0.61***	0.60***	0.60***
EMMacro – PCA	0.51	0.48	0.46	0.41	0.40	0.40
EMFinancial – PCA	0.68***	0.62**	0.61**	0.60**	0.54	0.53
EMGlobal – PCA	0.49	0.48	0.46	0.42	0.41	0.41
Local – PLS	0.81***	0.82***	0.82***	0.76***	0.73***	0.65***
EMMacro – PLS	0.85***	0.84***	0.81***	0.79***	0.75***	0.69***
EMFinancial – PLS	0.79***	0.76***	0.76***	0.78***	0.79***	0.73***
EMGlobal – PLS	0.82***	0.80***	0.80***	0.76***	0.73***	0.66***
$rx_{t+1}^{(4)}$						
RW	0.48^{NA}	0.47^{NA}	0.46^{NA}	0.42^{NA}	0.40^{NA}	0.39^{NA}
Local – PCA	0.72***	0.67***	0.66***	0.66***	0.67***	0.65***
EMMacro – PCA	0.44	0.44	0.46	0.38	0.39	0.39
EMFinancial – PCA	0.58*	0.56*	0.54	0.56**	0.53**	0.52**
EMGlobal – PCA	0.52	0.49	0.48	0.45	0.44	0.41
Local – PLS	0.86***	0.87***	0.85***	0.81***	0.75***	0.68***
EMMacro – PLS	0.89***	0.88***	0.86***	0.85***	0.78***	0.75***
EMFinancial – PLS	0.85***	0.84***	0.80***	0.84***	0.79***	0.74***
EMGlobal – PLS	0.82***	0.82***	0.81***	0.78***	0.75***	0.65***
$rx_{t+1}^{(5)}$						
RW	0.47^{NA}	0.46^{NA}	0.45^{NA}	0.41^{NA}	0.39^{NA}	0.39^{NA}
Local – PCA	0.68***	0.67***	0.67***	0.66***	0.64***	0.69***
EMMacro – PCA	0.52	0.49	0.46	0.41	0.44	0.42
EMFinancial – PCA	0.62***	0.62***	0.61***	0.56**	0.56***	0.54***
EMGlobal – PCA	0.53	0.53	0.53	0.48	0.47	0.44
Local – PLS	0.82***	0.82***	0.82***	0.81***	0.78***	0.75***
EMMacro – PLS	0.87***	0.85***	0.85***	0.84***	0.79***	0.78***
EMFinancial – PLS	0.82***	0.80***	0.78***	0.81***	0.76***	0.76***
EMGlobal – PLS	0.84***	0.82***	0.82***	0.80***	0.75***	0.67***

Note: See notes to Table 6.

Table 11: Performance of active trading strategies: Sharpe ratios

Brazil	$h = 1$	$h = 2$	$h = 3$	$h = 6$	$h = 9$	$h = 12$
RW	0.19	0.20	0.22	0.29	0.37	0.44
Local – PCA	0.70	0.69	0.69	0.68	0.67	0.59
EMMacro – PCA	0.70	0.69	0.69	0.64	0.57	0.46
EMFinancial – PCA	0.58	0.55	0.54	0.48	0.45	0.40
EMGlobal – PCA	0.68	0.67	0.68	0.72	0.71	0.61
Local – PLS	0.54	0.54	0.53	0.52	0.48	0.43
EMMacro – PLS	0.55	0.54	0.53	0.52	0.50	0.47
EMFinancial – PLS	0.58	0.58	0.58	0.56	0.53	0.53
EMGlobal – PLS	0.56	0.55	0.55	0.55	0.55	0.51
Indonesia						
RW	0.41	0.42	0.44	0.44	0.38	0.32
Local – PCA	0.29	0.29	0.29	0.27	0.23	0.20
EMMacro – PCA	0.36	0.34	0.33	0.29	0.24	0.21
EMFinancial – PCA	0.51	0.45	0.40	0.30	0.25	0.22
EMGlobal – PCA	0.56	0.56	0.56	0.60	0.54	0.48
Local – PLS	0.67	0.67	0.67	0.63	0.47	0.34
EMMacro – PLS	0.58	0.58	0.59	0.57	0.47	0.38
EMFinancial – PLS	0.71	0.70	0.70	0.60	0.44	0.30
EMGlobal – PLS	0.58	0.59	0.60	0.57	0.47	0.37
Mexico						
RW	0.52	0.51	0.49	0.41	0.31	0.22
Local – PCA	0.79	0.78	0.77	0.73	0.67	0.57
EMMacro – PCA	0.92	0.88	0.85	0.74	0.64	0.55
EMFinancial – PCA	0.87	0.85	0.82	0.76	0.70	0.58
EMGlobal – PCA	0.86	0.79	0.74	0.63	0.54	0.44
Local – PLS	0.95	0.95	0.95	0.90	0.85	0.77
EMMacro – PLS	0.88	0.87	0.86	0.83	0.80	0.74
EMFinancial – PLS	0.97	0.97	0.97	0.89	0.82	0.72
EMGlobal – PLS	0.89	0.87	0.86	0.84	0.80	0.73
South – Africa						
RW	0.49	0.49	0.49	0.49	0.50	0.52
Local – PCA	0.73	0.70	0.69	0.67	0.57	0.56
EMMacro – PCA	0.77	0.74	0.72	0.66	0.59	0.62
EMFinancial – PCA	0.55	0.54	0.53	0.50	0.46	0.47
EMGlobal – PCA	0.66	0.64	0.63	0.57	0.52	0.55
Local – PLS	0.58	0.57	0.56	0.54	0.51	0.47
EMMacro – PLS	0.61	0.61	0.62	0.60	0.57	0.53
EMFinancial – PLS	0.62	0.61	0.61	0.57	0.54	0.47
EMGlobal – PLS	0.65	0.67	0.68	0.64	0.59	0.51
Turkey						
RW	-0.32	-0.35	-0.38	-0.42	-0.45	-0.45
Local – PCA	0.10	0.06	0.03	0.02	0.01	0.09
EMMacro – PCA	0.15	0.11	0.08	0.00	-0.04	-0.08
EMFinancial – PCA	0.06	0.01	-0.02	-0.11	-0.08	-0.06
EMGlobal – PCA	0.19	0.16	0.14	0.07	0.02	-0.04
Local – PLS	0.37	0.38	0.38	0.34	0.29	0.21
EMMacro – PLS	0.40	0.39	0.38	0.36	0.31	0.25
EMFinancial – PLS	0.37	0.36	0.35	0.34	0.33	0.23
EMGlobal – PLS	0.38	0.38	0.37	0.37	0.31	0.21

Note: The table reports the average of the Sharpe ratios across maturities and emerging markets for h-step ahead forecasts where h=1,2,3,6,9,12 based on the models specifications that are defined in Section 3.3. The results are based on portfolio performances for a mean-variance investor with relative risk aversion coefficient of five who decides portfolio weights based on the forecasts of corresponding model.

Table 12: Performance of active trading strategies: Utility gain

Brazil	$h = 1$	$h = 2$	$h = 3$	$h = 6$	$h = 9$	$h = 12$
Local − PCA	77.62	58.30	47.89	43.23	54.04	7.62
EMMacro − PCA	66.01	46.16	41.27	3.96	-18.85	-97.86
EMFinancial − PCA	39.35	21.12	8.39	-22.97	-32.81	-53.81
EMGlobal − PCA	49.37	28.82	24.19	44.38	52.25	-27.64
Local − PLS	61.56	57.71	53.75	28.41	-2.99	-45.03
EMMacro − PLS	55.51	49.34	41.84	16.37	1.11	-31.03
EMFinancial − PLS	73.11	68.18	65.21	42.97	9.19	-10.52
EMGlobal − PLS	57.58	50.21	47.92	28.72	15.60	-22.52
Indonesia						
Local − PCA	-17.98	-23.58	-28.94	-39.19	-36.39	-28.47
EMMacro − PCA	-4.73	-12.37	-19.86	-35.17	-34.48	-26.21
EMFinancial − PCA	17.86	6.90	-4.82	-28.96	-31.31	-24.94
EMGlobal − PCA	31.64	27.23	20.23	33.00	41.72	50.24
Local − PLS	48.32	46.26	44.32	40.75	26.30	8.06
EMMacro − PLS	30.27	27.71	26.83	20.29	13.17	11.65
EMFinancial − PLS	45.32	40.59	36.93	16.04	-10.40	-49.02
EMGlobal − PLS	29.97	27.56	26.69	19.94	13.14	11.37
Mexico						
Local − PCA	18.47	18.44	19.15	32.87	42.18	41.56
EMMacro − PCA	51.45	50.22	49.93	59.04	72.38	85.83
EMFinancial − PCA	43.63	43.42	42.70	54.72	72.95	83.07
EMGlobal − PCA	57.49	53.57	50.91	55.46	69.44	81.61
Local − PLS	58.18	63.49	68.16	81.88	100.58	113.02
EMMacro − PLS	40.17	40.95	43.14	59.28	80.89	99.47
EMFinancial − PLS	65.53	71.58	76.43	88.07	103.52	113.86
EMGlobal − PLS	42.20	41.76	42.36	59.53	81.10	95.89
SouthAfrica						
Local − PCA	23.17	17.49	13.25	1.72	-16.29	-12.88
EMMacro − PCA	22.02	18.71	11.66	-15.49	-35.73	-24.92
EMFinancial − PCA	-6.86	-8.51	-10.03	-14.31	-21.76	-22.93
EMGlobal − PCA	9.45	6.45	1.58	-16.78	-33.39	-29.50
Local − PLS	9.78	7.19	3.97	1.07	-4.44	-24.17
EMMacro − PLS	-7.85	-7.83	-14.36	-18.96	-23.66	-43.43
EMFinancial − PLS	8.48	6.81	6.87	1.62	-1.54	-15.25
EMGlobal − PLS	9.54	12.11	12.88	5.10	-5.97	-18.82
Turkey						
Local − PCA	35.79	34.97	34.32	23.40	-12.16	12.26
EMMacro − PCA	50.16	48.46	47.56	37.11	2.41	1.83
EMFinancial − PCA	40.90	38.45	34.96	22.24	-1.31	15.81
EMGlobal − PCA	52.95	52.84	52.28	39.31	0.21	-1.20
Local − PLS	86.50	89.07	91.54	88.96	57.20	37.39
EMMacro − PLS	88.03	90.97	93.44	93.24	63.14	41.71
EMFinancial − PLS	78.76	78.57	79.42	72.74	42.46	24.24
EMGlobal − PLS	86.31	88.43	91.03	89.05	58.91	29.78

Note: The table displays the performance measure for the active mean-variance with relative risk aversion coefficient of five who decides portfolio weights based on the forecasts of corresponding model. Entries are the performance fees in annualized basis points for switching from the strategy indicated by benchmark model to the corresponding factor-augmented predictive regression.

Forecasting Local Currency Bond Risk Premia of Emerging Markets: The Role of Cross-Country Macro-Financial Linkages

Oguzhan Cepni[a,*], Rangan Gupta[b], I. Ethem Güney[a], M. Hasan Yilmaz[b]

July 2019

Online Appendix

This contains additional tables that report the active performance of trading strategies for all maturities separately, and lists Bloomberg definitions of all variables used in our experiments.

Keywords: Bond risk premia, Emerging markets, Factor extraction methods, Out-of-sample forecasting.

JEL Classification: C22, C53, C55, G12.

---

[a] Oguzhan Cepni (Oguzhan.Cepni@tcmb.gov.tr), I. Ethem Güney (Ethem.Guney@tcmb.gov.tr) and M. Hasan Yilmaz (Muhammed.Yilmaz@tcmb.gov.tr) Central Bank of the Republic of Turkey, Haci Bayram Mah. Istiklal Cad. No:10 06050 Ulus, Altndag, Ankara, Turkey.

[b] Department of Economics, University of Pretoria, Pretoria, 0002, South Africa; Email address: rangan.gupta@up.ac.za.

[*] Corresponding author.

1. Data List

Table A1: Dataset-Brazil

Number	Ticker	Description
1	2236689 Index	IMF Brazil Unemployment Rate
2	BZJCYTOT Index	Brazil Government Registered Job Creation Total NSA YTD
3	BZMW Index	Brazil Minimum Wage
4	BZREOFFR Index	Brazil Sao Paulo Secovi Real Estate Units Offered
5	BZRESTRT Index	Brazil Sao Paulo Secovi Real Estate Units Started
6	BZREPERD Index	Secovi Brazil Real Estate Units Average Sale Time Period
7	BZRESOLD Index	Brazil Sao Paulo Secovi Real Estate Units Sold
8	IBREINCM Index	FGV Brazil IGP-M Construction Prices INCC-M
9	USDBRL Curncy	USDBRL Spot Exchange Rate - Price of 1 USD in BRL
10	EURBRL Curncy	EURBRL Spot Exchange Rate - Price of 1 EUR in BRL
11	JPYBRL Curncy	JPYBRL Spot Exchange Rate - Price of 1 JPY in BRL
12	USDBRLV1M Index	USDBRL 1 Month ATM Implied Volatility
13	USDBRL25R3M Index	USDBRL 3 Month 25 Delta Risk Reversal
14	BISBBRR Index	Brazil Real Effective Exchange Rate Broad
15	IBOV Index	Ibovespa Brasil Sao Paulo Stock Exchange Index
16	PX_TO_BOOK_RATIO	Ibovespa Brasil Sao Paulo Stock Exchange Index
17	PE_RATIO	Ibovespa Brasil Sao Paulo Stock Exchange Index
18	GROSS_AGGTE_DVD_YLD	Ibovespa Brasil Sao Paulo Stock Exchange Index
19	DVD_PAYOUT_RATIO	Ibovespa Brasil Sao Paulo Stock Exchange Index
20	TOT_DEBT_TO_TOT_ASSET	Ibovespa Brasil Sao Paulo Stock Exchange Index
21	WCAUBRAZ Index	Bloomberg Brazil Exchange Market Capitalization USD
22	IFNCBV Index	Brazil Financial Index
23	BZLIQDTY Index	Bovespa Volume Brazil Settlement
24	IBOVIEE Index	Sao Paulo Stock Exchange Electrical Energy Index
25	CBRZ1U5 Curncy	Federative Republic of Brazil
26	BZSTSETA Index	Brazil Selic Target Rate
27	BZTJLP Index	Brazil BNDES Long Term Interest Rate TJLP
28	BZAD1Y Index	Anbima Brazil Govt Bond Fixed Rate 1 Year
29	BZAD2Y Index	Anbima Brazil Govt Bond Fixed Rate 2 Years
30	GEBR5Y Index	Brazil Government Generic Bond 5 Year
31	GEBR10Y Index	Brazil Government Generic Bond 10 Year
32	GEBU10Y Index	Brazil Government Generic Bond 10 Year USD
33	BZLNTOTA Index	Brazil Financial System Loans
34	BZLNPTOT Index	Brazil Financial Private System Loans
35	BZMBMB Index	Brazil Monetary Base
36	BZMS1 Index	Brazil Money Supply M1 Brazil M1
37	BZMS2 Index	Brazil Money Supply M2 Brazil M2
38	BZMS3 Index	Brazil Money Supply M3 Brazil M3

Continued on next page

Table A1 – *Continued from previous page*

Number	Ticker	Description
39	BZMS4 Index	Brazil Money Supply M4 Brazil M4
40	BRCDDEFT Index	Brazil Personal Loans More Than 90 Days Late
41	BZIDINTL Index	Brazil International Daily Reserves
42	BRCCVEHB Index	Brazil Consumer Credit Operations for Vehicle Acquisition
43	BZPIIPCA Index	Brazil CPI IPCA Dec 1993=100
44	BZCILIVE Index	Brazil FIPE CPI Sao Paulo Living
45	BZCIFOOD Index	Brazil FIPE CPI Sao Paulo Food Main
46	BZCIPERS Index	Brazil FIPE CPI Sao Paulo Personal
47	BZCITRAN Index	Brazil CIPE CPI Sao Paulo Transportation
48	IPEAEXIN Index	Brazil IPEA Export Price Index
49	IPEAIMIN Index	Brazil IPEA Import Price Index
50	IBREIPAM Index	FGV Brazil IGP-M Wholesale Prices IPA-M
51	IBREIPA1 Index	FGV Brazil Wholesale Prices IPA-10
52	BZICINDX Index	CNI Brazil Industrial Confidence General
53	BZCCI Index	CNI Brazil Consumer Confidence
54	OLEDBRAZ Index	OECD Brazil Composite Leading Ind. Total Trend Restored Stck
55	OEBRI003 Index	OECD Brazil Cons. Opin. Confidence Composite & OECD Indicators SA amp adj
56	MPMIBRMA Index	Markit Brazil Manufacturing PMI SA
57	BZTBBALM Index	Brazil Trade Balance FOB Balance NSA
58	BZTBEXPM Index	Brazil Trade Balance FOB Exports
59	BZTBIMPM Index	Brazil Trade Balance FOB Imports NSA
60	BZTWBALW Index	Brazil Trade Balance Weekly Balance
61	BZDPGOD Index	Brazil General Government Net Debt
62	BZDPNDTL Index	Brazil Public Net Debt
63	BZPBPRDM Index	Brazil Public Primary Budget Result
64	BZCACURR Index	Brazil Current Account Monthly
65	BZCA%GDP Index	Brazil Current Account % of GDP Last 12 Months Accumulated
66	BZFDTMON Index	Brazil Foreign Direct Investment Net
67	BZDPNDT% Index	Brazil Public Net Debt % of GDP
68	BSRFTOFD Index	Brazil Total Federal Revenue
69	BZBGEXPN Index	Brazil Central Government Total Expenditures
70	BZPBNODM Index	Brazil Public Nominal Budget Result
71	BZBGPRIM Index	Brazil Central Government Primary Budget Surplus/Deficit
72	BZBGNOMI Index	Brazil Central Government Nominal Budget Surplus/Deficit
73	BZIPTLSA Index	Brazil Real Industrial Production SA 2012=100
74	BZIXEXTR Index	Brazil Industrial Production Activity Extractive Industry2012
75	BZASSUBT Index	Brazil Auto Sales Subtotal
76	BZCNCNIS Index	CNI Brazil Manufacture Industry Capacity Utilization SA
77	BZCNSALS Index	CNI Brazil Manufacture Industry Real Sales SA 2006=100
78	BZCNEMPS Index	CNI Brazil Manufacture Industry Employment SA 2006=100
79	BZCNHOUS Index	CNI Brazil Manufacture Industry Working Hours SA 2006=100

Continued on next page

Table A1 – *Continued from previous page*

Number	Ticker	Description
80	BZVPTLVH Index	Anfavea Brazil Vehicle Production
81	BZVLTLVH Index	Anfavea Brazil Vehicle Sales Licensed
82	BZVXEXTL Index	Anfavea Brazil Vehicle Exports
83	BZVLTOTL Index	Anfavea Brazil Vehicle Sales Licensed Cars
84	BZRTRTSA Index	Brazil Retail Sales Volume SA
85	BZRTCOSA Index	Brazil Retail Sales Volume Construction Materials Index SA
86	BZRTFDSA Index	Brazil Retail Sales Volume Supermarket Food Beverages & Tobacco SA
87	BZRTFURN Index	Brazil Retail Sales Volume Furniture & Domestic Appliance
88	OEBRV008 Index	OECD Brazil Prod. Manufacturing Total Manufacturing SA 2010=100
89	BZEASA Index	Economic Activity GDP SA IBC-BR
90	BZEDTLEX Index	Brazil External Debt Brazil External Gross Debt
91	BZGDCAPX Index	Brazil GDP Qtrly Gross Formation of Fixed Capital SA 1995=100
92	BZGDFAMX Index	Brazil GDP Qtrly Family Consumption SA 1995=100
93	BZGDAGRX Index	Brazil GDP Qtrly Agriculture SA 1995=100
94	BZGDIDTX Index	Brazil GDP Qtrly Industry SA 1990=100
95	BZGDTRNX Index	Brazil GDP Qtrly Transformation Industry SA 1995=100
96	BZGDSERX Index	Brazil GDP Qtrly Services SA 1995=100
97	EHGDBR Index	Brazil Real GDP (Annual YoY %)

Table A2: Dataset-Indonesia

Number	Ticker	Description
1	IDWGCDN Index	Indonesia Wage for Constructio
2	IDWGSMN Index	Indonesia Wage for Household S
3	IDELHOUS Index	Indonesia Property Loans House
4	USDIDR Index	USD-IDR X-RATE
5	JPYIDR Index	JPY-IDR X-RATE
6	CADIDR Curncy	CAD-IDR X-RATE
7	USDIDRV1M Index	USD-IDR OPT VOL 1M
8	USDIDR25R3M Index	USD-IDR RR 25D 3M
9	BISBIDR Index	Indonesia Real Effective Excha
10	WCAUINDO Index	Bloomberg Indonesia Exchange M
11	MXID Index	MSCI INDONESIA
12	JCI Index	JAKARTA COMPOSITE INDEX
13	PX_TO_BOOK_RATIO	JAKARTA COMPOSITE INDEX-Price to Book Ratio
14	PE_RATIO	JAKARTA COMPOSITE INDEX- Price Earnings Ratio (P/E)
15	GROSS_AGGTE_DVD_YLD	JAKARTA COMPOSITE INDEX -Gross Aggregate Dividend Yield
16	DVD_PAYOUT_RATIO	JAKARTA COMPOSITE INDEX -Dividend Payout Ratio
17	TOT_DEBT_TO_TOT_ASSET	JAKARTA COMPOSITE INDEX - Total Debt to Total Assets
18	INDON CDS USD SR 5Y D14 Corp	INDON CDS USD SR 5Y D14
19	BIASINVP Index	BI Indonesian Bank Val

Continued on next page

Table A2 – *Continued from previous page*

Number	Ticker	Description
20	IDBRLDR Index	Indonesia Bank Ratio - Loan to
21	IDBRCAR Index	Indonesia Bank Ratio - Capital
22	IDBRNIM Index	Indonesia Bank Ratio - Net Int
23	IDBRROA Index	Indonesia Bank Ratio Return on
24	GTIDR1Y Govt	INDONESIA GOVERNMENT
25	GTIDR5Y Govt	INDONESIA GOVERNMENT
26	GTIDR10Y Govt	INDONESIA GOVERNMENT
27	GTUSDID5Y Govt	REPUBLIC OF INDONESIA
28	IDGBFRGN Index	Indonesia Govt Bond Outstandin
29	ELI GIND Index	J.P. Morgan EMBIG Indonesia So
30	IDBLHOUS Index	Indonesia Outstanding Loans by
31	IDBLOTHR Index	Indonesia Outstanding Loans by
32	IDBLSHOP Index	Indonesia Outstanding Loans by
33	IDWCTOTL Index	Indonesia Working Capital Loan
34	IDWCLIO Index	ID Total Working Capital Loans
35	IDWCCONS Index	Indonesia Working Capital Loan
36	IDWCMANU Index	Indonesia Working Capital Loan
37	IDBRNPLG Index	Indonesia Bank Ratio - Non Per
38	IDBDTD Index	Indonesia All Commercial Banks
39	IDBDALLR Index	Indonesia All Commercial Banks
40	IDBDALLF Index	Indonesia All Commercial Banks
41	IDM2YOY Index	Indonesia Money Supply M2 YoY
42	IDM1YOY Index	Indonesia Money Supply M1 YoY
43	IDRMR Index	Indonesia Reserve Base Money
44	IDPGDEBT Index	Indonesia Government Portfolio
45	IDNRIRR Index	Indonesia Net Foreign Assets I
46	IDGFA Index	Indonesia Net International Re
47	IDGFFORC Index	Indonesia International Reserv
48	IDCPIY Index	Indonesia CPI YoY
49	IDCCI Index	Bank Indonesia Consumer Confid
50	MPMIIDMA Index	Nikkei Indonesia Manufacturing
51	IDEXPY Index	Indonesia Exports YoY
52	IDBALTOL Index	Indonesia Trade Balance
53	IDEXPEGY Index	Indonesia Export Oil & Gas YoY
54	IDIMPTLY Index	Indonesia Import Total YoY
55	IDIMPEGY Index	Indonesia Import Oil & Gas YoY
56	IDEDTOTL Index	Indonesia External Debt Total
57	IDEDGI Index	Indonesia External Debt Govern
58	IDMPIYOY Index	Indonesia Industrial/Manufactu
59	ASEAINDO Index	Automotive Production by Indon
60	ASEAINDS Index	Automotive Sales for Indonesia

Continued on next page

Table A2 – *Continued from previous page*

Number	Ticker	Description
61	IDVHCLOC Index	Gaikindo Indonesia Motor Vehic
62	IDVHMTLC Index	Asosiasi Industri Sepedamotor
63	IDRSTOTY Index	Indonesia Retail Sales Survey
64	IDCETOTL Index	Indonesia Cement Consumption
65	IDTOTOT Index	Indonesia Tourist Arrivals
66	IDHTTOTL Index	Indonesia Hotel Occupancy Rate
67	OLE3INDO Index	OECD Indonesia Composite Leadi
68	IDEMUNE% Index	Indonesia Unemployment Rate
69	IDEMEMPL Index	Indonesia Number of People Emp
70	CPNFIDCU Index	BIS Indonesia Credit to Non Fi
71	EHPIID Index	Indonesia Consumer Price Index
72	IDTIBINC Index	Indonesia Business Tendency In
73	IDTIBPRD Index	Indonesia Business Tendency In
74	IDTIBTOT Index	Indonesia Business Tendency In
75	IDTINCGR Index	Indonesia Consumer Tendency In
76	IDTIIRCG Index	Indonesia Consumer Tendency In
77	IDTIHINC Index	Indonesia Consumer Tendency In
78	IDCABAL Index	Indonesia Balance of Payments
79	IDCAPORT Index	Indonesia BOP Financial Accoun
80	IDPUMANU Index	Indonesia Production Utilizati
81	IDPUTOTL Index	Indonesia Production Utilizati
82	IDCGRFY Index	Indonesia GDP Current Prices E
83	IDCGREXY Index	Indonesia GDP Current Prices E
84	IDCGRIMY Index	Indonesia GDP Current Prices E
85	IDCGRGY Index	Indonesia GDP Current Prices E
86	IDCGRHY Index	Indonesia GDP Current Prices P
87	EHGDID Index	Indonesia Real GDP (Annual YoY

Table A3: Dataset-Mexico

Number	Ticker	Description
1	MXUEUNSA Index	Mexico Unemployment Rate SA for Workers 15 and Older ENOE
2	MXWICONS Index	Mexico Formal Job Temporary & Permanent Workers Construction
3	MXWIRETL Index	Mexico Formal Job Temporary & Permanent Workers Retail
4	MXWITRCO Index	Mexico Formal Job Temporary & Permanent Workers Transportation & Communication
5	MXWICOSV Index	Mexico Formal Job Temporary & Permanent Workers Commercial Services
6	MXWIMANU Index	Mexico Formal Job Temporary & Permanent Workers Manufacturing
7	MXWITOTL Index	Mexico Formal Job Temporary & Permanent Workers Total
8	MXUETEPT Index	Mexico Employment Rate
9	MXMIMITO Index	Mexico Wages by Manufacturing Industry Total
10	IMEFMNOR Index	Mexico Manufacturing Index New Orders SA

Continued on next page

Table A3 – *Continued from previous page*

Number	Ticker	Description
11	IMEFNMNO Index	Mexico Non Manufacturing Index New Orders SA
12	MXBLMORT Index	Mexico Bank Lending Mortgages
13	MXCSBUIL Index	Mexico Construction Spending Buildings
14	USDMXN Index	USDMXN Spot Exchange Rate - Price of 1 USD in MXN
15	JPYMXN Index	JPYMXN Spot Exchange Rate - Price of 1 JPY in MXN
16	CADMXN Curncy	CADMXN Spot Exchange Rate - Price of 1 CAD in MXN
17	USDMXNV1M Index	USDMXN 1 Month ATM Implied Volatility
18	USDMXN25R3M Index	USDMXN 3 Month 25 Delta Risk Reversal
19	BISBMXR Index	Mexico Real Effective Exchange Rate Broad
20	WCAUMEX Index	Bloomberg Mexico Exchange Market Capitalization USD
21	MEXBOL Index	Mexican Stock Exchange Mexican Bolsa IPC Index
22	PX_TO_BOOK_RATIO	Mexican Stock Exchange -Price to Book Ratio
23	PE_RATIO	Mexican Stock Exchange - Price Earnings Ratio (P/E)
24	GROSS_AGGTE_DVD_YLD	Mexican Stock Exchange -Gross Aggregate Dividend Yield
25	DVD_PAYOUT_RATIO	Mexican Stock Exchange -Dividend Payout Ratio
26	TOT_DEBT_TO_TOT_ASSET	Mexican Stock Exchange - Total Debt to Total Assets
27	MXONBR Index	Bank of Mexico Official Overnight Rate
28	MEX CDS USD SR 5Y D14 Corp	United Mexican States
29	MXFRCINR Index	BOM Government Funding Rate Closing Interest Rate
30	MPTBF CMPN Curncy	MXN T-BILL 6 MO
31	MPTB1 CMPN Curncy	MXN T-BILL 1 YR
32	GMXN02YR Index	Mexico Generic 2 Year
33	GMXN05YR Index	Mexico Generic 5 Year
34	MXLCLFCB Index	Mexico Loans from Commercial Banks
35	MXLCMOLO Index	Mexico Mortgage Loans
36	MXLCCOLO Index	Mexico Consumption Loans
37	MXBDNPLR Index	Mexico Non-Performing Loans as % of Total Loans
38	MXLCEXSE Index	Mexico External Sector
39	MXBLCNST Index	Mexico Bank Lending Construction
40	MXBLMAIN Index	Mexico Bank Lending Manufacturing Industry
41	MXBLFFAF Index	Mexico Bank Lending Farming Forestry and Fishing
42	MXBLSAOA Index	Mexico Bank Lending Services and Other Activities
43	MXDFCONS Index	Mexico Private Sector Direct Financing Total
44	MXBLPERF Index	Mexico Bank Lending Performing Loans
45	MXBLNONB Index	Mexico Bank Lending Performing Loans for Non Bank Financial
46	MXMB Index	Mexico Monetary Base Money Base
47	MXMSM1 Index	Mexico Money Supply M1-M4 M1 Total
48	MXMSM2 Index	Mexico Money Supply M1-M4 M2 Total
49	MXMSM3 Index	Mexico Money Supply M1-M4 M3 Total
50	MXMSM4 Index	Mexico Money Supply M1-M4 M4 Total
51	MXDEINT Index	Mexico Federal Government Net Domestic Debt in Millions of Mexican Pesos

Continued on next page

Table A3 – *Continued from previous page*

Number	Ticker	Description
52	MXDEEXT Index	Mexico Public Sector Net External Debt in Millions of U.S. Dollars
53	MXERBUDD Index	Mexico Public Rev & Expend Budgetary Deficit YTD
54	MXIRINUS Index	Mexico International Reserves in USD
55	MXDBPDDV Index	Mexico Development Banks Total Public Demand Deposits Volume
56	MXDBPTDV Index	Mexico Development Banks Total Public Time Deposits Volume
57	2735E55 Index	IMF Mexico Financial Corp Deposits
58	MXPII Index	Mexico Producer Price Index
59	MFGSMANU Index	Mexico Fin Gds & Srvs Secondary Sector Manufacturing 2012
60	MFGSCONS Index	Mexico Fin Gds & Srvs Secondary Sector Construction 2012
61	MXPIIXO Index	Mexico Producer Price Index Ex Oil
62	MFGSMINE Index	Mexico Fin Gds & Srvs Primary Sector Mining 2012
63	MFGSELGA Index	Mexico Fin Gds & Srvs Tertiary Water Electricity and Gas 2012
64	MPPRIMPT Index	Mexico International Trade Import Price NSA 1980=100
65	MPPREXPT Index	Mexico International Trade Export Price NSA 1980=100
66	MXCPI Index	Mexico CPI
67	MXCCCORE Index	Mexico Core CPI
68	MXCNFDAT Index	Mexico CPI Index 2010=100 Food Drinks and Tobacco
69	MXCNNFGD Index	Mexico CPI Index 2010=100 Non Food Goods
70	MXCNSERV Index	Mexico CPI Index 2010=100 Services
71	MXCNAGRI Index	Mexico CPI Index 2010=100 Agriculture
72	MXCNERAG Index	Mexico CPI Index 2010=100 Energy Rates Auth by Govt
73	MXCIHOUS Index	Mexico CPI by Expenditure Housing
74	IMEFMAIN Index	Mexico Manufacturing Index SA
75	IMEFNMIN Index	Mexico Non Manufacturing Index SA
76	IMEFMPRO Index	Mexico Manufacturing Index Production SA
77	SCMXPROI Index	Mexico Producer Confidence Indicator SA
78	MXMAAITR Index	Mexico Manufacturing Aggregate Trend Indicator
79	MXMAEXPT Index	Mexico Manufacturing Aggregate Trend Indicator Exports
80	MXMAMNOR Index	Mexico Manufacturing Aggregate Orders Indicator Manufacturing Orders SA
81	CSMXCONU Index	MX Consumer Confidence Index SA
82	CSMXPOSU Index	Mexico Compared Economic Situation with a Year Ago at Present SA
83	MXCLYLEA Index	Mexico Leading Indicator YoY
84	MXCLSALE Index	Mexico Seasonally Adjusted Leading Indicator
85	MXCLSACO Index	Mexico Seasonally Adjusted Coincident Indicator
86	MXTBBEXP Index	Mexico Trade Balance Exports Monthly Total USD Million
87	MXOTAMER Index	Petroleos Mexicanos (Pemex) Crude Oil Mexico Trade Data/Americas
88	MXOTEURO Index	Petroleos Mexicanos (Pemex) Crude Oil Mexico Trade Data/Europe
89	MXEXPETR Index	Mexico Nominal Current Account Balance
90	MXEXNONP Index	Mexico Exports by Sector Non Petroleum Mexico Exports Monthly Total USD Million
91	MXRETOT$ Index	Mexican Remittances Money Sent from Workers Outside Mexico
92	IGAEINDX Index	Mexico Indicator of Economic Activity Index SA

Continued on next page

Table A3 – *Continued from previous page*

Number	Ticker	Description
93	IGAEPADI Index	Mexico Economic Activity Primary Activities Series Index SA
94	MINVCNST Index	Mexico Capital Investment Construction
95	MXPSTOTL Index	Mexico Industrial Production Total Seasonally Adjusted
96	MXPSOGSA Index	Mexico Industrial Production Oil and Gas Extraction Seasonally Adjusted
97	MXPSELEC Index	Mexico Industrial Production Utilities Seasonally Adjusted
98	MXPSCONS Index	Mexico Industrial Production Construction Seasonally Adjusted
99	MXPSMANF Index	Mexico Industrial Production Manufacturing Seasonally Adjusted
100	MXSATOTL Index	Mexico Antad Same-Store Sales Overall YoY%
101	MXSLMOGA Index	Mexico Gasoline Sales Monthly
102	MXSLDIES Index	Mexico Diesel Sales Monthly
103	MXMNMCEQ Index	Mexico Capacity Utilization Manufacture of Machinery and Equipment
104	MXMNPECO Index	Mexico Capacity Utilization Manufacture of Petroleum Products and Coal
105	MXVPTOTL Index	Mexico Vehicle Production Total Production
106	MXWRTWHO Index	Mexico Wholesale/Retail Sale Totl Whole
107	MXVHTOTL Index	Mexican Vehicle Sales Auto+truck NSA
108	MXVETOTL Index	Mexican Vehicle Exports Total
109	MDPCSAIN Index	Mexico Total Season Adjusted Index Base 2008
110	MINVTOSA Index	Mexico Gross Fixed Inv Total Seasonally Adjusted
111	MXR4TTSA Index	Mexico Real GDP by Industry Total SA
112	MXR4CNSA Index	Mexico Real GDP by Industry Construction SA
113	MXR4MFSA Index	Mexico Real GDP by Industry Manufacturing SA
114	MXR4RESA Index	Mexico Real GDP by Industry Wholesale and Retail Trade SA
115	MXGNTTAL Index	Mexico Nominal GDP Total SA
116	MXCACUAC Index	Mexico Nominal Current Account Balance
117	MXSDPRYO Index	Mexico Supply & Demand Private Consumption YoY
118	MXSDPUYO Index	Mexico Supply & Demand Public Consumption YoY
119	MXSDGCFY Index	Mexico Supply & Demand Total SA Annual Change 2008 Pesos
120	MEXHMEXY Index	Mexico House Price Index YoY
121	EHGDMX Index	Mexico Real GDP (Annual YoY %)

Table A4: Dataset-South Africa

Number	Ticker	Description
1	SATCTREM Index	Trade Activity Index Employment
2	SAPME Index	South Africa Barclays PMI Employment SA
3	SAUEQEMP Index	South Africa Labour- Employed
4	SAUEQABS Index	South Africa Labour - Labor Absorption Rate
5	SAUEQPRT Index	South Africa Labour - Labor Force Participation Rate
6	SAUEQNLF Index	South Africa Labour - Not in the Labor Force
7	EHUPZA Index	South Africa Unemployment Rate (%)
8	SATCTRBL Index	Trade Activity Index Backlog on Orders

Continued on next page

Table A4 – *Continued from previous page*

Number	Ticker	Description
9	SATCTEBL Index	Trade Expectations Index Backlog on Orders
10	SATCTRNO Index	Trade Activity Index New Orders
11	SATCTENO Index	Trade Expectations Index New Orders
12	SACSPSTO Index	SA Recorded Building Plans Total SA
13	SACSPSRB Index	SA Recorded Building Plans Residentual Buildings SA
14	SACSPSNR Index	SA Recorded Building Plans Non-Residentual Buildings SA
15	SACSPSAA Index	SA Recorded Building Plans Additions and Alterations SA
16	SACSCSTO Index	SA Completed Buildings Recorded Total SA
17	SACSCSRB Index	SA Completed Buildings Recorded Residentual Buildings SA
18	SACSCSNR Index	SA Completed Buildings Recorded Non-Residentual Buildings SA
19	SACSCSAA Index	SA Completed Buildings Recorded Additions and Alterations SA
20	ZAR Curncy	USDZAR Spot Exchange Rate - Price of 1 USD in ZAR
21	EURZAR Curncy	EURZAR Spot Exchange Rate - Price of 1 EUR in ZAR
22	GBPZAR Curncy	GBPZAR Spot Exchange Rate - Price of 1 GBP in ZAR
23	JPYZAR Curncy	JPYZAR Spot Exchange Rate - Price of 1 JPY in ZAR
24	TRYZAR Curncy	TRYZAR Spot Exchange Rate - Price of 1 TRY in ZAR
25	USDZARV1M Index	USDZAR 1 Month ATM Implied Volatility
26	USDZAR25R3M Index	USDZAR 3 Month 25 Delta Risk Reversal
27	BISBZAR Index	South Africa Real Effective Exchange Rate Broad
28	TOP40 Index	FTSE/JSE Africa Top40 Tradeable Index
29	JFINX Index	FTSE/JSE Africa Financials Index
30	JBIND Index	FTSE/JSE Africa Basic Materials Index
31	JGIND Index	FTSE/JSE Africa Industrials Index
32	JGOLD Index	FTSE/JSE Africa Gold Mining Index
33	WCAUSAF Index	Bloomberg South Africa Exchange Market Capitalization USD
34	JALSH Index	FTSE/JSE Africa All Share Index
35	PX_TO_BOOK_RATIO	FTSE/JSE Africa All Share Index-Price to Book Ratio
36	PE_RATIO	FTSE/JSE Africa All Share Index- Price Earnings Ratio (P/E)
37	GROSS_AGGTE_DVD_YLD	FTSE/JSE Africa All Share Index -Gross Aggregate Dividend Yield
38	DVD_PAYOUT_RATIO	FTSE/JSE Africa All Share Index -Dividend Payout Ratio
39	TOT_DEBT_TO_TOT_ASSET	FTSE/JSE Africa All Share Index- Total Debt to Total Assets
40	REPSOU CDS USD SR 5Y D14 Corp	Republic of South Africa
41	SARPRT Index	South Africa Repo Avg Rate
42	GSAB2YR Index	South Africa Govt Bonds 2 Year Note Generic Bid Yield
43	GSAB3YR Index	South Africa Govt Bonds 3 Year Note Generic Bid Yield
44	GSAB5YR Index	South Africa Govt Bonds 5 Year Note Generic Bid Yield
45	GSAB10YR Index	South Africa Govt Bonds 10 Year Note Generic Bid Yield
46	SALQCMPN Index	South Africa Liquidations Cos
47	SACEI Index	South Africa Private Credit Extension
48	SACEINV Index	South Africa Private Credit Extension Investments
49	SACEMORT Index	South Africa Private Credit Extension Mortgage Advances

Continued on next page

Table A4 – *Continued from previous page*

Number	Ticker	Description
50	SACELEAS Index	South Africa Private Credit Extension Leasing Finance
51	SACELOAN Index	South Africa Private Credit Extension Total Loans and Advances
52	SACESALE Index	South Africa Private Credit Extension Installment Sales Credit
53	SACEHOUS Index	South Africa Private Credit Extension Of Which To Households
54	SAMYSAM3 Index	South Africa Money Supply M3 Seasonally Adjusted
55	SAMYM1 Index	South Africa Money Supply M1
56	SAMYM2 Index	South Africa Money Supply M2
57	SAMYM0 Index	South Africa Money Supply M0
58	199.055 Index	IMF South Africa Foreign Exchange Reserves in Millions of USD
59	SANOGOL$ Index	South Africa Gold Reserves
60	SANOGR$ Index	South Africa Gross Reserves
61	1995E55 Index	IMF South Africa Deposits in Rand
62	SACPI Index	South Africa CPI 2012=100
63	SABCI Index	SACCI South Africa Business Confidence
64	SAPMI Index	South Africa Barclays SA
65	SAPMIPP Index	South Africa Barclays PMI Prices NSA
66	SCP8COUN Index	South Africa CPI For Total Country NSA
67	SCP8EPNY Index	South Africa Ex Food NAB Petrol & Energy YoY
68	SCP8EENR Index	South Africa Ex Energy
69	MPMIZAWA Index	#N/A Invalid Security
70	SACWC Index	South Africa Consumer Confidence
71	SACWE Index	South Africa Consumer Confidence Economic Position in Next 12m
72	SACWF Index	South Africa Consumer Confidence Financial Position During Next 12m.
73	SACBLI Index	Composite Business Cycle Indicator - Leading Indicator
74	SACBLG Index	Composite Business Cycle Indicator - Lagging Indicator
75	SACBCI Index	Composite Business Cycle Indicator - Coincident Indicator
76	SANOFP$ Index	South Africa Net Open Foreign Currency Position
77	SABBBAL Index	South Africa Budget Summary National Budget Balance
78	SATBAL Index	South Africa Trade Balance Incl Oil Arms & Bullion
79	SATBEX Index	South Africa Trade Balance Exports Incl Oil Arms & Bullion
80	SATBEOTH Index	South Africa Trade Export Other Gd
81	SATBIM Index	South Africa Trade Balance Imports Incl Oil Arms & Bullion
82	SABBEXP Index	South Africa Budget Summary National Expenditures
83	SABBREV Index	South Africa Budget Summary National Revenue
84	SACTLVL Index	South Africa Current Account SA
85	SACTMEX Index	South Africa Current Account SA - Merchandise Exports Free on Board
86	SACTGEX Index	South Africa Current Account SA - Net Gold Exports
87	SACTLMI Index	South Africa Current Account SA - Less Merchandise Imports
88	SACTCTR Index	South Africa Current Account SA - Current Transfers Net Receipts
89	NAAMTTMS Index	NAAMSA South Africa Total Market Sales Level
90	SARSTCSA Index	South Africa Retail Sales Total Sales Constant Prices SA 2012=100

Continued on next page

Table A4 – *Continued from previous page*

Number	Ticker	Description
91	SASRGEN Index	South Africa Retail Trade Sales Constant 2012 Prices General
92	SATWCOS Index	South Africa Wholesale Trade Constant 2000 Prices SA
93	SFMPPET Index	South Africa Manufacturing Production SA 2005=100 Petroleum Chemical Prod
94	SFPMI Index	South Africa Manufacturing Production SA 2010=100
95	SFMPFB Index	South Africa Manufacturing Production SA 2005=100 Food & Beverages
96	SFMPTCF Index	South Africa Manufacturing Production SA 2005=100 Textile Leather Footwear
97	SFMPMVP Index	South Africa Manufacturing Production SA 2005=100 Parts & Other Transport Equip
98	SAMSTGSA Index	South Africa Mining Sales Total Including Gold SA
99	SAMPGDSY Index	South Africa Mining Production Volume Gold SA YoY
100	SAMPTTSY Index	South Africa Mining Production Volume Total Inc Gold SA YoY
101	SACUI Index	South Africa Utilization of Production Capacity
102	SAPW09Y Index	South Africa Electricity Production Index Year on Year %
103	SABTHDIQ Index	South Africa Household Debt to Disposable Income of Households
104	SAGNDISA Index	South Africa Nominal Household Disposable Income SA
105	SAPW08Y Index	South Africa Electricity Consumption Year on Year %
106	SADXFCFR Index	South Africa Real GDP Gross Fixed Capital Formation SA
107	SASGAGR Index	South Africa Agriculture SA Constant Prices
108	SASGMINE Index	South Africa Mining SA Constant Prices
109	SASGMANU Index	South Africa Manufacturing SA Constant Prices
110	SASGELEC Index	South Africa Electricity SA Constant Prices
111	SASGCON Index	South Africa Construction sa constant 2000 prices
112	SASGWRH Index	South Africa Wholesale Retail Hotels SA Constant Prices
113	SADXRGSA Index	South Africa Real GDP Expenditure on GDP
114	EHGDZA Index	South Africa Real GDP (Annual YoY %)

Table A5: Dataset-Turkey

Number	Ticker	Description
1	TULSUR Index	Turkey Labor Statistics Unemployment Rate SA
2	TULSER Index	Turkey Labor Statistics Employment Rate SA
3	TULSCO Index	Turkey Labor Statistics Employment in Construction SA
4	TULSSER Index	Turkey Labor Statistics Employment in Services SA
5	TULSIN Index	Turkey Labor Statistics Employment in Industry SA
6	TULSAGRI Index	Turkey Labor Statistics Employment in Agriculture SA
7	TULSLPAR Index	Turkey Labor Statistics Labor Participation Rate SA
8	TULSNO Index	Turkey Labor Statistics Non Agricultural Unemployment Rate SA
9	TULSYOU Index	Turkey Labor Statistics Youth Unemployment Rate SA
10	USDTRY Index	USDTRY Spot Exchange Rate - Price of 1 USD in TRY
11	EURTRY Index	EURTRY Spot Exchange Rate - Price of 1 EUR in TRY
12	JPYTRY Curncy	JPYTRY Spot Exchange Rate - Price of 100 JPY in TRY
13	USDTRYV1M Index	USDTRY 1 Month ATM Implied Volatility

Continued on next page

Table A5 – *Continued from previous page*

Number	Ticker	Description
14	USDTRY25R3M Index	USDTRY 3 Month 25 Delta Risk Reversal
15	CPIXBREX Index	Turkey Real Effective Exchange Rate (2003=100) CPI
16	XU100 Index	Borsa Istanbul 100 Index
17	XBANK Index	Borsa Istanbul Banks Sector Index
18	XUSIN Index	Borsa Istanbul Industrials Sector Index
19	PX_TO_BOOK_RATIO	Borsa Istanbul 100 Index-Price to Book Ratio
20	PE_RATIO	Borsa Istanbul 100 Index- Price Earnings Ratio (P/E)
21	GROSS_AGGTE_DVD_YLD	Borsa Istanbul 100 Index -Gross Aggregate Dividend Yield
22	DVD_PAYOUT_RATIO	Borsa Istanbul 100 Index -Dividend Payout Ratio
23	TOT_DEBT_TO_TOT_ASSET	Borsa Istanbul 100 Index - Total Debt to Total Assets
24	WCAUTURK Index	Bloomberg Turkey Exchange Market Capitalization USD
25	CTURK1U5 Curncy	Republic of Turkey
26	TUBRONRA Index	Turkey Overnight Lending Rate Announcement
27	TUBROBRA Index	Turkey Overnight Borrowing Rate Announcement
28	IECM1Y Index	Turkish Government Bond 1Y Compound Yield
29	IECM5Y Index	Turkish Government Bond 5Y Compound Yield
30	TUBOL54 Index	Turkey Banks Balance Sheet Deposits - Residents in Dollars ($)
31	WAIRCASH Index	Weighted Average Interest Rates for Turkish Banks Loans - Cash
32	WAIRVEHI Index	Weighted Average Interest Rates for Banks Loans - Vehicles
33	WAIRHOUS Index	Weighted Average Interest Rates for Banks Loans - Housing
34	WAIRCOMM Index	Weighted Average Interest Rates for Banks Loans - Commercial
35	GTRU2YR Index	USD Turkey Govt Bond Generic Bid Yield 2 Year
36	GTRU5YR Index	USD Turkey Govt Bond Generic Bid Yield 5 Year
37	GTRU10YR Index	USD Turkey Govt Bond Generic Bid Yield 10 Year
38	TBRDELT Index	Export Loans - Total
39	TBRDWCLT Index	Working Capital Loans - Total
40	TBRDTLTL Index	Total Loans
41	TUCRTOTL Index	Turkey Consumer Loans Total
42	DPMLAUTO Index	Deposit Money Banks Loans Private Sector - Automobile
43	DPMLINCC Index	Deposit Money Banks Loans Private Sector - Individual Credit Cards
44	DPMLHOUS Index	Deposit Money Banks Loans Private Sector - Housing
45	DPMLCOOT Index	Deposit Money Banks Loans Private Sector - Consumer & Other
46	TUNMM1 Index	Turkey Money Supply M1
47	TUNMM2 Index	Turkey New Money Supply M2
48	TUNMM3 Index	Turkey New Money Supply M3
49	TUNMTDTR Index	Turkey Money Supply Time Deposits TRY
50	TUNMSDFX Index	Turkey Money Supply Sight Deposits FX
51	TUNMSDTR Index	Turkey Money Supply Sight Deposits TRY
52	TUNMTDFX Index	Turkish Money Supply Time Deposits FX
53	TBRDLOAN Index	Turkey SME Loans Total
54	TURWL Index	Turkey Gross Foreign Exchange Reserves (Weekly)

Continued on next page

Table A5 – *Continued from previous page*

Number	Ticker	Description
55	TUDPPI Index	Turkey Domestic PPI
56	TUDPC Index	Turkey Domestic PPI Manufacturing
57	TUDPB Index	Turkey Domestic PPI Mining & Quarrying
58	TUDP6 Index	Turkey Domestic PPI Crude Petroleum & Natural Gas
59	TUDP10 Index	Turkey Domestic PPI Food Products YoY
60	TUDP29 Index	Turkey Domestic PPI Motor Vehicles Trailers & Semi-Trailers
61	TUDP25 Index	Turkey Domestic PPI Fabricated Metal Products Except Machinery & Equipment
62	TUCPI Index	Turkey CPI
63	TUCPF Index	Turkey CPI Food & Non Alcoholic Beverages
64	TUCPH Index	Turkey CPI Housing Water Electricity Gas & Other Fuels
65	TUCPHO Index	Turkey CPI Hotels Cafes & Restaurants
66	TUCPFH Index	Turkey CPI Furnishings Household Equipment & Routine House Maintenance
67	TUCPR Index	Turkey CPI Recreation & Culture
68	TUCXSG Index	Turkey CPI Ex Seasonal Goods
69	TUCXEF Index	Turkey CPI Ex Energy Food Non Alcoholic Bev Alcoholic Bev Tobacco & Gold
70	TUCOGY2S Index	Turkey Real Sector Confidence Index Volume of Orders (Current Situation) SA
71	TUCOGY3S Index	Turkey Real Sector Confidence Stocks of Finished Goods (Current Situation) SA
72	TUCOGY7S Index	Turkey Real Sector Confidence Index Export Orders (Next 3 Months) SA
73	TUCOREAL Index	Turkey Conf IndxReal Sect
74	TUCDCONF Index	Consumer Confidence
75	TUCOGY1S Index	TU Real Sector Confidence SA
76	TUCOGY9S Index	TU Business Situation SA
77	MPMITRMA Index	Markit Turkey Manufacturing PMI
78	TUCALVLP Index	Turkey Balance of Payments Portfolio Investment 12M YoY Level Change USD
79	TUCADIT Index	Turkey Balance of Payments Direct Investment in Turkey
80	TUDDTOTL Index	Turkey Domestic Debt Position Total
81	EHBBTR Index	Turkey Budget Balance (% GDP)
82	EHCATR Index	Turkey Current Account Balance (% GDP)
83	TUBTREV Index	Turkey Budget Deficit Revenue
84	TUTBEX Index	Turkey Trade Exports WDA
85	TUTBIM Index	Turkey Trade Imports WDA
86	ECOCTRN Index	Turkey Current Account Balance (Billion USD) NSA
87	TUKVDB17 Index	Turkey Short Term External Debt Stock
88	TUCSET Index	Turkey Motor Vehicle Industry Export Total
89	TUCSEP Index	Turkey Motor Vehicle Industry Export Passenger Cars
90	E50DGTR Index	EU Ind Prod Durable Consumer Goods Turkey SWDA
91	E50IGTR Index	EU Ind Prod Intermediate Goods Turkey SWDA
92	E50KGTR Index	EU Ind Prod Capital Goods Turkey SWDA
93	TUIOMT Index	Turkey Industrial Production Manufacturing 2010=100
94	TUINTURN Index	Turkey Industry Turnover 2010=100
95	TUIOSA Index	Turkey Industrial Production SWDA 2010=100

Continued on next page

Table A5 – *Continued from previous page*

Number	Ticker	Description
96	TUIOST Index	Turkey Industrial Production Mining 2010=100
97	TUIOET Index	Turkey Industrial Production Electricity 2010=100
98	TYCOLEVS Index	Turkey Capacity Utilization SA
99	TUCSPT Index	Turkey Motor Vehicle Industry Production Total
100	TUCSMT Index	Turkey Motor Vehicle Industry Sales Total
101	TUCSMP Index	Turkey Motor Vehicle Industry Sales Passenger Cars
102	TUTOARTO Index	Turkey Tourism Arriving Visitors Total
103	TUQRRESY Index	Turkey GDP at Constant Prices Final Consumption Expenditure of Residents YoY
104	TUQRIMY Index	Turkey Real GDP Imports of Goods and Services WDA YoY
105	EHGDTR Index	Turkey Real GDP (Annual YoY %)

2. Active Trading Strategies: Sharpe Ratios

Table B1: Sharpe ratios across all maturities

Panel A: Brazil

$rx_{t+1}^{(2)}$	$h=1$	$h=2$	$h=3$	$h=6$	$h=9$	$h=12$
RW	0.30	0.32	0.33	0.37	0.41	0.45
Local − PCA	0.79	0.78	0.78	0.75	0.68	0.58
EMMacro − PCA	0.82	0.81	0.79	0.68	0.59	0.55
EMFinancial − PCA	0.71	0.69	0.68	0.66	0.64	0.57
EMGlobal − PCA	0.79	0.80	0.82	0.84	0.79	0.69
Local − PLS	0.64	0.65	0.65	0.64	0.58	0.52
EMMacro − PLS	0.65	0.65	0.65	0.65	0.61	0.58
EMFinancial − PLS	0.72	0.72	0.73	0.72	0.66	0.67
EMGlobal − PLS	0.65	0.65	0.64	0.64	0.61	0.59
$rx_{t+1}^{(3)}$						
RW	0.19	0.20	0.21	0.27	0.33	0.40
Local − PCA	0.69	0.68	0.69	0.71	0.70	0.60
EMMacro − PCA	0.69	0.68	0.69	0.67	0.62	0.47
EMFinancial − PCA	0.62	0.61	0.61	0.57	0.55	0.49
EMGlobal − PCA	0.66	0.66	0.68	0.76	0.78	0.65
Local − PLS	0.56	0.55	0.55	0.53	0.49	0.44
EMMacro − PLS	0.54	0.53	0.53	0.53	0.50	0.44
EMFinancial − PLS	0.59	0.58	0.58	0.56	0.52	0.55
EMGlobal − PLS	0.58	0.57	0.57	0.55	0.57	0.54
$rx_{t+1}^{(4)}$						
RW	0.18	0.19	0.21	0.28	0.37	0.44
Local − PCA	0.68	0.67	0.67	0.66	0.66	0.60
EMMacro − PCA	0.66	0.66	0.66	0.63	0.55	0.41
EMFinancial − PCA	0.61	0.59	0.58	0.52	0.47	0.42
EMGlobal − PCA	0.66	0.64	0.66	0.70	0.73	0.65
Local − PLS	0.51	0.50	0.49	0.47	0.45	0.40
EMMacro − PLS	0.50	0.49	0.48	0.48	0.44	0.39
EMFinancial − PLS	0.53	0.52	0.52	0.51	0.50	0.50
EMGlobal − PLS	0.52	0.51	0.50	0.52	0.54	0.50
$rx_{t+1}^{(5)}$						
RW	0.10	0.11	0.13	0.23	0.36	0.46
Local − PCA	0.65	0.63	0.63	0.62	0.63	0.58
EMMacro − PCA	0.64	0.63	0.63	0.58	0.52	0.40
EMFinancial − PCA	0.36	0.33	0.29	0.19	0.14	0.14
EMGlobal − PCA	0.60	0.57	0.57	0.56	0.53	0.44
Local − PLS	0.47	0.46	0.45	0.43	0.40	0.36
EMMacro − PLS	0.49	0.47	0.46	0.42	0.45	0.46
EMFinancial − PLS	0.49	0.48	0.47	0.48	0.45	0.42
EMGlobal − PLS	0.48	0.47	0.47	0.48	0.47	0.42

Note: The table reports the Sharpe ratios for all maturities and across emerging markets separately for h-step ahead forecasts where h=1,2,3,6,9,12. based on the models specifications that are defined in Section 3.3. The results are based on portfolio performances for a mean-variance investor with relative risk aversion coefficient of five who decides portfolio weights based on the forecasts of corresponding model.

Table B2: Sharpe ratios across all maturities

Panel B: Indonesia

$rx_{t+1}^{(2)}$	$h = 1$	$h = 2$	$h = 3$	$h = 6$	$h = 9$	$h = 12$
RW	0.44	0.46	0.47	0.48	0.46	0.43
Local – PCA	0.43	0.44	0.45	0.45	0.43	0.40
EMMacro – PCA	0.42	0.43	0.43	0.44	0.42	0.40
EMFinancial – PCA	0.58	0.53	0.48	0.38	0.32	0.30
EMGlobal – PCA	0.42	0.43	0.44	0.44	0.42	0.40
Local – PLS	0.82	0.80	0.80	0.80	0.68	0.51
EMMacro – PLS	0.77	0.75	0.76	0.76	0.64	0.47
EMFinancial – PLS	0.82	0.80	0.79	0.72	0.59	0.45
EMGlobal – PLS	0.78	0.77	0.77	0.77	0.65	0.47
$rx_{t+1}^{(3)}$						
RW	0.41	0.43	0.44	0.45	0.40	0.34
Local – PCA	0.29	0.28	0.28	0.26	0.22	0.19
EMMacro – PCA	0.50	0.43	0.38	0.27	0.21	0.19
EMFinancial – PCA	0.50	0.43	0.38	0.27	0.21	0.19
EMGlobal – PCA	0.76	0.76	0.78	0.87	0.77	0.67
Local – PLS	0.71	0.71	0.72	0.67	0.45	0.29
EMMacro – PLS	0.54	0.54	0.55	0.51	0.41	0.35
EMFinancial – PLS	0.68	0.67	0.66	0.56	0.44	0.31
EMGlobal – PLS	0.54	0.54	0.55	0.51	0.41	0.35
$rx_{t+1}^{(4)}$						
RW	0.40	0.41	0.43	0.42	0.35	0.28
Local – PCA	0.24	0.23	0.23	0.20	0.15	0.12
EMMacro – PCA	0.28	0.27	0.26	0.23	0.18	0.14
EMFinancial – PCA	0.49	0.43	0.38	0.28	0.23	0.20
EMGlobal – PCA	0.71	0.71	0.70	0.80	0.72	0.65
Local – PLS	0.65	0.65	0.66	0.60	0.37	0.20
EMMacro – PLS	0.52	0.53	0.54	0.50	0.41	0.34
EMFinancial – PLS	0.68	0.67	0.66	0.55	0.39	0.24
EMGlobal – PLS	0.51	0.52	0.54	0.50	0.41	0.34
$rx_{t+1}^{(5)}$						
RW	0.39	0.40	0.42	0.40	0.32	0.24
Local – PCA	0.22	0.21	0.21	0.17	0.12	0.08
EMMacro – PCA	0.26	0.25	0.24	0.20	0.15	0.11
EMFinancial – PCA	0.48	0.42	0.38	0.28	0.23	0.19
EMGlobal – PCA	0.33	0.33	0.32	0.29	0.24	0.20
Local – PLS	0.52	0.52	0.52	0.46	0.40	0.35
EMMacro – PLS	0.50	0.52	0.53	0.49	0.40	0.34
EMFinancial – PLS	0.67	0.67	0.67	0.56	0.36	0.20
EMGlobal – PLS	0.50	0.52	0.53	0.49	0.40	0.34

Note: See notes to Table B1.

Table B3: Sharpe ratios across all maturities

Panel C: Mexico

$rx_{t+1}^{(2)}$	$h = 1$	$h = 2$	$h = 3$	$h = 6$	$h = 9$	$h = 12$
RW	0.41	0.39	0.37	0.30	0.22	0.13
Local – PCA	0.87	0.88	0.90	0.88	0.88	0.83
EMMacro – PCA	0.94	0.88	0.78	0.53	0.33	0.17
EMFinancial – PCA	0.98	0.95	0.90	0.84	0.76	0.58
EMGlobal – PCA	0.78	0.70	0.62	0.47	0.35	0.23
Local – PLS	0.97	0.97	0.96	0.87	0.80	0.73
EMMacro – PLS	0.88	0.86	0.85	0.80	0.74	0.68
EMFinancial – PLS	1.00	1.00	1.00	0.87	0.70	0.59
EMGlobal – PLS	0.88	0.86	0.85	0.80	0.74	0.68
$rx_{t+1}^{(3)}$						
RW	0.53	0.51	0.49	0.42	0.33	0.24
Local – PCA	0.73	0.68	0.65	0.57	0.51	0.45
EMMacro – PCA	1.01	0.99	0.97	0.88	0.79	0.71
EMFinancial – PCA	0.98	0.96	0.93	0.87	0.85	0.74
EMGlobal – PCA	0.94	0.86	0.80	0.67	0.58	0.50
Local – PLS	1.02	1.02	1.02	0.96	0.91	0.82
EMMacro – PLS	0.97	0.96	0.95	0.91	0.87	0.78
EMFinancial – PLS	1.05	1.05	1.02	0.89	0.86	0.75
EMGlobal – PLS	1.01	0.98	0.95	0.92	0.88	0.76
$rx_{t+1}^{(4)}$						
RW	0.60	0.58	0.57	0.48	0.38	0.28
Local – PCA	0.87	0.85	0.83	0.76	0.65	0.50
EMMacro – PCA	0.92	0.89	0.87	0.82	0.77	0.71
EMFinancial – PCA	0.89	0.88	0.87	0.82	0.79	0.70
EMGlobal – PCA	0.95	0.90	0.87	0.80	0.76	0.69
Local – PLS	0.92	0.92	0.92	0.89	0.86	0.77
EMMacro – PLS	0.88	0.87	0.86	0.84	0.82	0.76
EMFinancial – PLS	0.92	0.92	0.92	0.90	0.86	0.77
EMGlobal – PLS	0.89	0.87	0.87	0.84	0.82	0.75
$rx_{t+1}^{(5)}$						
RW	0.56	0.55	0.53	0.43	0.33	0.22
Local – PCA	0.71	0.69	0.69	0.69	0.63	0.49
EMMacro – PCA	0.79	0.78	0.77	0.73	0.68	0.63
EMFinancial – PCA	0.65	0.62	0.59	0.51	0.41	0.31
EMGlobal – PCA	0.76	0.72	0.68	0.58	0.47	0.35
Local – PLS	0.88	0.88	0.89	0.87	0.84	0.78
EMMacro – PLS	0.79	0.78	0.78	0.77	0.77	0.75
EMFinancial – PLS	0.90	0.91	0.93	0.91	0.85	0.79
EMGlobal – PLS	0.80	0.78	0.77	0.77	0.77	0.73

Note: See notes to Table B1.

Table B4: Sharpe ratios across all maturities

Panel D: South Africa

$rx_{t+1}^{(2)}$	$h = 1$	$h = 2$	$h = 3$	$h = 6$	$h = 9$	$h = 12$
RW	0.67	0.67	0.68	0.68	0.66	0.69
Local – PCA	0.83	0.80	0.83	0.94	0.76	0.74
EMMacro – PCA	0.84	0.83	0.81	0.90	0.82	0.75
EMFinancial – PCA	0.73	0.73	0.73	0.72	0.69	0.71
EMGlobal – PCA	0.74	0.73	0.72	0.67	0.63	0.68
Local – PLS	0.63	0.63	0.63	0.64	0.63	0.63
EMMacro – PLS	0.62	0.65	0.63	0.62	0.57	0.58
EMFinancial – PLS	0.70	0.67	0.68	0.67	0.64	0.63
EMGlobal – PLS	0.78	0.82	0.86	0.86	0.87	0.85
$rx_{t+1}^{(3)}$						
RW	0.49	0.49	0.49	0.48	0.48	0.50
Local – PCA	0.92	0.89	0.85	0.78	0.69	0.67
EMMacro – PCA	0.83	0.79	0.78	0.62	0.55	0.63
EMFinancial – PCA	0.56	0.55	0.55	0.51	0.47	0.48
EMGlobal – PCA	0.56	0.54	0.53	0.46	0.40	0.42
Local – PLS	0.70	0.69	0.69	0.66	0.62	0.57
EMMacro – PLS	0.67	0.65	0.66	0.60	0.55	0.53
EMFinancial – PLS	0.81	0.80	0.80	0.76	0.71	0.57
EMGlobal – PLS	0.75	0.77	0.79	0.78	0.73	0.62
$rx_{t+1}^{(4)}$						
RW	0.42	0.42	0.42	0.42	0.43	0.44
Local – PCA	0.76	0.74	0.71	0.62	0.52	0.50
EMMacro – PCA	0.75	0.73	0.69	0.61	0.52	0.57
EMFinancial – PCA	0.51	0.50	0.48	0.43	0.39	0.39
EMGlobal – PCA	0.77	0.74	0.72	0.62	0.55	0.60
Local – PLS	0.63	0.61	0.57	0.59	0.57	0.39
EMMacro – PLS	0.55	0.55	0.57	0.56	0.55	0.50
EMFinancial – PLS	0.53	0.52	0.51	0.48	0.44	0.38
EMGlobal – PLS	0.58	0.57	0.56	0.48	0.38	0.30
$rx_{t+1}^{(5)}$						
RW	0.39	0.38	0.38	0.39	0.42	0.45
Local – PCA	0.41	0.39	0.38	0.35	0.32	0.33
EMMacro – PCA	0.65	0.64	0.61	0.52	0.47	0.52
EMFinancial – PCA	0.41	0.39	0.37	0.33	0.29	0.29
EMGlobal – PCA	0.58	0.57	0.56	0.52	0.48	0.48
Local – PLS	0.38	0.37	0.36	0.29	0.24	0.27
EMMacro – PLS	0.60	0.61	0.61	0.60	0.62	0.52
EMFinancial – PLS	0.45	0.43	0.43	0.39	0.37	0.32
EMGlobal – PLS	0.51	0.50	0.49	0.44	0.36	0.28

Note: See notes to Table B1.

Table B5: Sharpe ratios across all maturities

Panel E: Turkey

$rx_{t+1}^{(2)}$	$h = 1$	$h = 2$	$h = 3$	$h = 6$	$h = 9$	$h = 12$
RW	-0.33	-0.36	-0.38	-0.42	-0.46	-0.48
Local – PCA	0.06	0.02	0.00	-0.05	-0.07	0.00
EMMacro – PCA	0.19	0.16	0.13	0.05	0.00	-0.03
EMFinancial – PCA	-0.06	-0.10	-0.12	-0.19	-0.13	-0.10
EMGlobal – PCA	0.12	0.09	0.06	-0.02	-0.08	-0.14
Local – PLS	0.36	0.36	0.36	0.32	0.27	0.19
EMMacro – PLS	0.40	0.38	0.37	0.36	0.34	0.26
EMFinancial – PLS	0.38	0.36	0.35	0.32	0.32	0.15
EMGlobal – PLS	0.38	0.36	0.36	0.35	0.26	0.18
$rx_{t+1}^{(3)}$						
RW	-0.31	-0.34	-0.37	-0.40	-0.44	-0.45
Local – PCA	0.12	0.09	0.05	0.04	0.03	0.09
EMMacro – PCA	0.09	0.04	0.02	-0.07	-0.10	-0.13
EMFinancial – PCA	-0.06	-0.11	-0.14	-0.20	-0.13	-0.09
EMGlobal – PCA	0.18	0.15	0.13	0.05	-0.01	-0.07
Local – PLS	0.38	0.38	0.38	0.34	0.29	0.22
EMMacro – PLS	0.40	0.39	0.39	0.36	0.30	0.25
EMFinancial – PLS	0.38	0.37	0.36	0.34	0.34	0.26
EMGlobal – PLS	0.39	0.38	0.38	0.38	0.31	0.21
$rx_{t+1}^{(4)}$						
RW	-0.32	-0.35	-0.38	-0.41	-0.45	-0.45
Local – PCA	0.09	0.06	0.03	0.02	0.03	0.10
EMMacro – PCA	0.13	0.08	0.06	-0.03	-0.07	-0.10
EMFinancial – PCA	0.14	0.10	0.05	-0.05	-0.05	-0.04
EMGlobal – PCA	0.21	0.19	0.17	0.11	0.05	-0.01
Local – PLS	0.38	0.38	0.38	0.35	0.29	0.21
EMMacro – PLS	0.39	0.39	0.39	0.36	0.30	0.24
EMFinancial – PLS	0.37	0.37	0.36	0.36	0.35	0.28
EMGlobal – PLS	0.38	0.38	0.38	0.37	0.34	0.21
$rx_{t+1}^{(5)}$						
RW	-0.31	-0.35	-0.39	-0.43	-0.45	-0.44
Local – PCA	0.13	0.09	0.06	0.06	0.06	0.15
EMMacro – PCA	0.19	0.15	0.12	0.04	0.00	-0.04
EMFinancial – PCA	0.20	0.16	0.11	0.01	0.01	0.00
EMGlobal – PCA	0.24	0.22	0.21	0.16	0.12	0.07
Local – PLS	0.37	0.38	0.38	0.35	0.30	0.23
EMMacro – PLS	0.38	0.38	0.38	0.36	0.31	0.25
EMFinancial – PLS	0.36	0.35	0.35	0.33	0.31	0.23
EMGlobal – PLS	0.38	0.38	0.38	0.37	0.34	0.24

Note: See notes to Table B1.

3. Active Trading Strategies: Utility Gains

Table C1: Utility gains across all maturities

Panel A: Brazil

$rx_{t+1}^{(2)}$	$h=1$	$h=2$	$h=3$	$h=6$	$h=9$	$h=12$
Local – PCA	115.08	106.10	97.65	74.62	59.10	20.49
EMMacro – PCA	153.09	151.49	147.03	110.20	63.06	61.03
EMFinancial – PCA	77.24	59.29	46.26	21.15	12.13	1.24
EMGlobal – PCA	96.09	102.47	108.43	116.39	106.61	61.61
Local – PLS	67.77	65.63	62.99	45.23	13.19	-21.15
EMMacro – PLS	62.05	58.85	54.60	38.99	16.09	-18.36
EMFinancial – PLS	84.03	80.63	77.69	50.42	10.23	-9.65
EMGlobal – PLS	64.56	59.88	53.54	36.25	16.13	-17.93
$rx_{t+1}^{(3)}$						
Local – PCA	65.85	49.22	42.93	55.64	77.83	36.32
EMMacro – PCA	68.53	52.93	63.00	67.89	52.84	-25.45
EMFinancial – PCA	26.09	5.00	-6.18	-26.65	-9.97	-28.37
EMGlobal – PCA	36.58	23.95	32.26	89.28	119.81	53.00
Local – PLS	75.81	71.95	67.38	39.47	-0.29	-50.45
EMMacro – PLS	56.17	50.94	46.49	28.52	0.57	-41.55
EMFinancial – PLS	85.44	78.83	73.83	44.49	7.48	-12.20
EMGlobal – PLS	74.94	66.95	64.22	31.62	17.72	-17.41
$rx_{t+1}^{(4)}$						
Local – PCA	66.97	45.07	34.94	36.20	50.77	3.51
EMMacro – PCA	24.99	3.06	-2.54	-32.98	-54.22	-160.48
EMFinancial – PCA	4.00	-18.83	-34.19	-80.14	-100.29	-139.38
EMGlobal – PCA	54.26	30.79	29.75	61.93	84.28	7.07
Local – PLS	54.71	51.35	48.10	14.54	-11.83	-54.40
EMMacro – PLS	55.11	47.87	37.04	26.00	-6.02	-39.19
EMFinancial – PLS	62.20	58.43	57.83	36.71	9.18	-5.91
EMGlobal – PLS	50.34	41.99	39.82	26.61	21.20	-16.46
$rx_{t+1}^{(5)}$						
Local – PCA	62.57	32.80	16.04	6.48	28.44	-29.83
EMMacro – PCA	17.41	-22.84	-42.42	-129.25	-137.08	-266.53
EMFinancial – PCA	50.06	39.01	27.65	-6.24	-33.10	-48.70
EMGlobal – PCA	10.57	-41.92	-73.68	-90.09	-101.69	-232.24
Local – PLS	47.94	41.89	36.52	14.41	-13.02	-54.13
EMMacro – PLS	48.72	39.70	29.24	-28.04	-6.22	-25.04
EMFinancial – PLS	60.75	54.85	51.48	40.27	9.86	-14.33
EMGlobal – PLS	40.47	32.01	34.10	20.40	7.37	-38.30

Note: The table reports the performance fees for all maturities and across emerging markets separately for h-step ahead forecasts where h=1,2,3,6,9,12. based on the models specifications that are defined in Section 3.3. The results are based on portfolio performances for a mean-variance investor with relative risk aversion coefficient of five who decides portfolio weights based on the forecasts of corresponding model.

Table C2: Utility gains across all maturities

Panel B: Indonesia

$rx_{t+1}^{(2)}$	$h = 1$	$h = 2$	$h = 3$	$h = 6$	$h = 9$	$h = 12$
Local – PCA	-3.02	-3.92	-4.92	-6.89	-8.19	-10.05
EMMacro – PCA	-2.96	-4.53	-6.23	-8.83	-10.42	-9.96
EMFinancial – PCA	8.17	1.17	-7.82	-26.10	-31.66	-30.53
EMGlobal – PCA	-2.74	-4.25	-5.99	-9.13	-11.08	-11.27
Local – PLS	41.71	39.08	38.17	42.35	37.79	16.34
EMMacro – PLS	34.50	31.70	31.25	35.48	30.55	9.35
EMFinancial – PLS	39.30	35.46	33.08	24.13	14.02	-4.83
EMGlobal – PLS	34.89	32.72	32.18	35.75	30.95	8.91
$rx_{t+1}^{(3)}$						
Local – PCA	-19.47	-25.03	-30.78	-45.19	-49.75	-45.27
EMMacro – PCA	21.70	8.66	-4.99	-35.26	-47.73	-44.41
EMFinancial – PCA	21.70	8.66	-4.99	-35.26	-47.73	-44.41
EMGlobal – PCA	76.92	74.93	72.61	96.35	101.92	102.44
Local – PLS	58.64	57.02	57.60	53.59	26.53	-1.40
EMMacro – PLS	37.19	33.72	30.96	17.99	4.02	2.89
EMFinancial – PLS	44.04	37.41	32.31	4.52	-20.16	-52.18
EMGlobal – PLS	36.86	33.34	30.51	17.55	3.81	2.54
$rx_{t+1}^{(4)}$						
Local – PCA	-23.39	-31.42	-38.93	-52.04	-45.16	-32.14
EMMacro – PCA	-17.51	-25.46	-32.88	-48.43	-42.08	-28.77
EMFinancial – PCA	24.96	12.59	-0.59	-26.78	-24.28	-12.33
EMGlobal – PCA	67.51	60.40	43.07	86.49	108.55	128.28
Local – PLS	53.64	53.17	53.47	53.09	21.92	-19.56
EMMacro – PLS	28.17	25.57	25.04	15.14	6.88	14.22
EMFinancial – PLS	51.40	45.87	41.07	14.41	-16.31	-62.12
EMGlobal – PLS	27.60	25.00	24.52	14.51	6.86	14.15
$rx_{t+1}^{(5)}$						
Local – PCA	-26.04	-33.94	-41.13	-52.65	-42.48	-26.41
EMMacro – PCA	-20.17	-28.13	-35.33	-48.16	-37.69	-21.72
EMFinancial – PCA	16.58	5.17	-5.88	-27.69	-21.56	-12.47
EMGlobal – PCA	-15.13	-22.15	-28.78	-41.71	-32.51	-18.50
Local – PLS	39.27	35.75	28.06	13.98	18.96	36.87
EMMacro – PLS	21.21	19.86	20.08	12.57	11.22	20.13
EMFinancial – PLS	46.52	43.61	41.24	21.09	-19.15	-76.94
EMGlobal – PLS	20.52	19.16	19.53	11.96	10.97	19.88

Note: See notes to Table C1.

Table C3: Utility gains across all maturities

Panel C: Mexico

$rx_{t+1}^{(2)}$	$h = 1$	$h = 2$	$h = 3$	$h = 6$	$h = 9$	$h = 12$
Local – PCA	19.28	19.85	20.86	24.82	33.37	38.99
EMMacro – PCA	18.11	15.23	12.55	6.22	0.86	-3.87
EMFinancial – PCA	19.84	18.66	16.72	21.36	26.77	26.67
EMGlobal – PCA	12.49	10.61	8.74	4.19	3.44	2.03
Local – PLS	22.75	24.83	26.50	26.79	30.39	32.94
EMMacro – PLS	18.72	19.65	21.20	22.47	23.87	28.12
EMFinancial – PLS	24.73	27.18	29.45	29.31	26.95	26.76
EMGlobal – PLS	18.67	19.67	21.19	22.46	23.69	28.12
$rx_{t+1}^{(3)}$						
Local – PCA	34.69	30.49	27.97	27.44	34.93	42.83
EMMacro – PCA	63.07	62.16	62.75	67.12	75.88	85.13
EMFinancial – PCA	53.73	52.83	50.77	62.02	83.73	92.39
EMGlobal – PCA	64.34	57.92	52.78	48.00	53.84	60.67
Local – PLS	69.90	74.29	78.00	86.34	100.35	107.33
EMMacro – PLS	63.07	65.00	67.35	76.43	90.15	97.15
EMFinancial – PLS	76.62	80.73	81.65	80.86	96.22	97.49
EMGlobal – PLS	66.02	64.97	64.32	77.81	89.22	94.16
$rx_{t+1}^{(4)}$						
Local – PCA	52.29	53.25	54.12	67.02	77.69	74.63
EMMacro – PCA	76.76	73.86	72.15	86.52	109.69	132.95
EMFinancial – PCA	56.50	59.19	60.65	78.51	105.53	123.67
EMGlobal – PCA	91.22	86.75	84.51	96.82	126.44	153.22
Local – PLS	76.36	81.88	86.74	104.59	131.46	146.79
EMMacro – PLS	61.39	61.99	64.89	86.20	113.84	138.56
EMFinancial – PLS	78.93	84.32	88.43	107.51	132.36	148.00
EMGlobal – PLS	65.03	64.79	66.87	86.36	114.23	136.34
$rx_{t+1}^{(5)}$						
Local – PCA	-32.39	-29.83	-26.35	12.19	22.74	9.80
EMMacro – PCA	47.88	49.63	52.25	76.29	103.07	129.11
EMFinancial – PCA	44.46	43.00	42.66	57.01	75.78	89.56
EMGlobal – PCA	61.92	59.01	57.62	72.82	94.03	110.54
Local – PLS	63.68	72.98	81.37	109.79	140.13	165.02
EMMacro – PLS	17.50	17.14	19.13	52.00	95.71	134.05
EMFinancial – PLS	81.82	94.11	106.17	134.59	158.53	183.17
EMGlobal – PLS	19.09	17.61	17.06	51.49	97.27	124.96

Note: See notes to Table C1.

Table C4: Utility gains across all maturities

Panel D: South Africa

$rx_{t+1}^{(2)}$	$h = 1$	$h = 2$	$h = 3$	$h = 6$	$h = 9$	$h = 12$
Local – PCA	19.42	15.73	16.82	23.89	13.68	7.83
EMMacro – PCA	20.82	19.56	17.69	23.75	19.05	10.15
EMFinancial – PCA	10.92	10.14	9.59	8.04	6.88	6.10
EMGlobal – PCA	13.94	12.25	10.88	7.38	5.37	5.35
Local – PLS	-4.33	-4.95	-5.12	-4.41	-3.56	-7.34
EMMacro – PLS	-6.09	-1.61	-5.36	-2.89	-5.98	-11.38
EMFinancial – PLS	7.74	4.68	4.59	3.48	3.00	-1.51
EMGlobal – PLS	5.89	10.01	13.17	14.88	18.93	10.67
$rx_{t+1}^{(3)}$						
Local – PCA	72.13	66.36	59.84	48.57	33.36	27.92
EMMacro – PCA	55.16	48.44	44.24	20.41	19.24	33.42
EMFinancial – PCA	1.34	-0.22	-1.54	-8.93	-19.01	-22.00
EMGlobal – PCA	9.48	6.35	3.74	-8.28	-21.47	-22.23
Local – PLS	26.74	26.55	25.80	23.39	16.04	-4.29
EMMacro – PLS	21.96	17.69	17.13	3.77	-5.55	-17.92
EMFinancial – PLS	56.05	56.91	57.09	51.79	44.33	8.02
EMGlobal – PLS	40.79	46.77	51.04	49.31	38.99	7.30
$rx_{t+1}^{(4)}$						
Local – PCA	41.63	30.28	19.56	-25.93	-73.16	-51.50
EMMacro – PCA	50.60	42.97	25.81	-3.37	-34.12	-14.83
EMFinancial – PCA	-4.49	-8.16	-11.65	-23.94	-38.26	-38.81
EMGlobal – PCA	45.00	35.70	21.32	-31.71	-64.15	-40.85
Local – PLS	29.90	22.90	11.56	15.99	11.71	-45.34
EMMacro – PLS	1.77	5.39	7.00	-0.10	-5.25	-25.42
EMFinancial – PLS	4.42	2.49	0.83	-8.22	-17.62	-28.71
EMGlobal – PLS	22.07	20.16	17.92	-2.49	-26.95	-34.26
$rx_{t+1}^{(5)}$						
Local – PCA	-40.49	-42.40	-43.20	-39.65	-39.03	-35.79
EMMacro – PCA	-38.50	-36.14	-41.10	-102.75	-147.09	-128.42
EMFinancial – PCA	-35.22	-35.80	-36.51	-32.40	-36.67	-37.00
EMGlobal – PCA	-30.62	-28.49	-29.62	-34.52	-53.30	-60.29
Local – PLS	-13.21	-15.75	-16.34	-30.69	-41.95	-39.71
EMMacro – PLS	-49.04	-52.79	-76.18	-76.60	-77.86	-119.01
EMFinancial – PLS	-34.31	-36.84	-35.05	-40.57	-35.87	-38.82
EMGlobal – PLS	-30.59	-28.51	-30.63	-41.29	-54.86	-59.01

Note: See notes to Table C1.

Table C5: Utility gains across all maturities

Panel E: Turkey

$rx_{t+1}^{(2)}$	$h = 1$	$h = 2$	$h = 3$	$h = 6$	$h = 9$	$h = 12$
Local – PCA	55.51	53.75	53.07	43.01	-23.82	-15.65
EMMacro – PCA	74.69	72.85	69.95	58.04	-5.87	-7.40
EMFinancial – PCA	41.82	41.03	42.94	45.15	-13.19	3.21
EMGlobal – PCA	63.61	63.22	61.86	48.91	-22.16	-28.78
Local – PLS	97.88	99.63	100.97	101.17	44.76	29.13
EMMacro – PLS	97.09	100.30	100.34	104.14	51.38	38.51
EMFinancial – PLS	88.54	87.12	86.97	81.34	21.12	-14.58
EMGlobal – PLS	97.99	98.91	100.50	101.55	41.43	22.93
$rx_{t+1}^{(3)}$						
Local – PCA	36.09	35.56	34.77	21.70	-18.52	4.72
EMMacro – PCA	41.32	39.63	39.40	29.18	-12.37	-14.50
EMFinancial – PCA	15.77	13.17	10.34	0.83	-40.33	-14.64
EMGlobal – PCA	50.53	50.74	50.44	37.40	-10.29	-13.16
Local – PLS	84.30	86.98	89.72	87.05	48.36	33.92
EMMacro – PLS	87.12	89.48	92.47	92.01	55.75	40.03
EMFinancial – PLS	77.23	76.85	77.60	69.90	32.63	19.20
EMGlobal – PLS	84.88	86.94	89.72	88.06	50.02	24.42
$rx_{t+1}^{(4)}$						
Local – PCA	24.88	24.38	23.82	10.84	-13.45	16.62
EMMacro – PCA	38.88	36.74	36.23	23.99	0.85	0.58
EMFinancial – PCA	47.85	43.81	36.20	9.73	7.84	21.49
EMGlobal – PCA	46.80	46.58	46.01	29.60	3.54	4.07
Local – PLS	81.84	84.63	87.38	81.84	60.34	32.76
EMMacro – PLS	84.08	86.89	90.13	86.74	66.14	35.11
EMFinancial – PLS	76.86	77.52	78.85	71.97	58.45	48.70
EMGlobal – PLS	81.35	83.80	86.63	81.53	63.96	21.40
$rx_{t+1}^{(5)}$						
Local – PCA	26.68	26.19	25.60	18.05	7.17	43.34
EMMacro – PCA	45.74	44.64	44.66	37.21	27.02	28.64
EMFinancial – PCA	58.14	55.79	50.34	33.25	40.42	53.17
EMGlobal – PCA	50.88	50.81	50.82	41.36	29.76	33.07
Local – PLS	81.96	85.04	88.07	85.78	75.34	53.77
EMMacro – PLS	83.82	87.20	90.81	90.05	79.29	53.17
EMFinancial – PLS	72.41	72.78	74.23	67.74	57.65	43.66
EMGlobal – PLS	81.01	84.08	87.26	85.05	80.24	50.37

Note: See notes to Table C1.