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Technology-Investing Countries and Stock Return Predictability

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Technology-Investing Countries and Stock Return Predictability

ABSTRACT

For 77 technology-investing countries we test whether their stock market returns are predictable. We find that exchange rate returns and U.S. stock excess returns predict stock market returns for most countries in our sample, while crude oil and inflation predict returns of less than 40% of countries. While in out-of-sample tests the evidence of predictability declines, U.S. returns still beat the constant returns model for three-quarters of countries in our sample. A portfolio of all 77 countries offers a mean-variance investor annualized profits of between 5.7% and 8.0%, and profits are maximized when return forecasts are based on U.S. returns.

Keywords: *Technology; Profits; Stock Returns; Predictability; Portfolio.*

I. INTRODUCTION

Recent literature has demonstrated that technology-investing countries have stock returns that are predictable using technology variables, such as patents granted and research and development; see, inter alia, Hirshleifer, Hsu, and Li (2013), Hsu and Huang (2010), and Hsu (2009). In this paper, we take this evidence as our starting point and as our motivation to ask a different but related question. We ask whether: (i) of all technology-investing countries (conditional on data availability), which factors other than technology predict returns?; and (ii) whether by using any of these recognized return predictors (exchange rate, inflation, U.S. stock excess returns, and oil price returns), can stock return forecasting models be proposed which could be useful for devising successful trading strategies?

Our approaches to addressing these questions are fivefold. First, we select all countries for which historical time-series data (1981 to 2014) on both patents (number of patents granted to residents) and stock market price index are available. This search leads to a total of 77 countries, allowing us to rank countries (based on mean patents granted over the period 1981 to 2014) from the most technology-investing to the least. According to our ranking exercise, countries with the most number of patents granted are those that invest most in technologies and *vice-versa*. From this ranking, we also categorize countries into high and low patent investing countries, and high and low patent investing developed and emerging countries. This allows us to form eight different portfolios of countries apart from a portfolio consisting of all 77 countries.

Second, because we have time-series data for each country, we choose from the broader literature on stock return predictability a list of predictors that have been successful in predicting stock returns in general. This search ends with the following choices. (1) We consider U.S. stock excess returns (proxied by the S&P500 price index returns in excess of the U.S. three-month Treasury bill rate) because recent studies find that U.S. stock excess returns are a powerful predictor of country returns (see Rapach *et al.* 2013; Nyberg and Ponka, 2016).[‡] (2) We consider bilateral exchange rate returns (local currency vis-à-vis the U.S. dollar) based on the empirical evidence that exchange rate returns have predictive power (see Bartov and Bohnar, 1994; Phylaktis and Ravazzolo, 2005). (3) We also consider the inflation rate, which has traditionally been used as a predictor of stock returns (see Nelson, 1976; Fama and Schwert, 1977; Gultekin, 1983; Campbell and Vuolteenaho, 2004; Rapach *et al.*, 2010; Gupta, and Modise, 2013). (4) The most popular predictor that dominates much of the recent literature on stock return predictability is the oil price; see Driesprong *et al.* (2008) and Phan *et al.* (2015).[§] We, therefore, also use the oil price returns as a predictor.[**]

Third, we test whether each of the four predictors are able to predict country excess returns using a time-series predictive regression model that addresses statistical issues of predictor endogeneity and persistency, and model heteroscedasticity. We follow this analysis with an out-of-sample forecasting evaluation. Fourth, we use the best (most successful) predictors to forecast excess stock returns and, for a mean-variance investor, devise dynamic

[‡] Laopodis (2016) shows how for the United States, industry returns also have predictive power. In our paper though we do not consider industry returns given the focus on 77 countries. Several authors demonstrate the "leader" role of the U.S. in shaping the global financial system. The work of Rizova (2010), for instance, formalises the idea that a two-country Lucas-tree framework with gradual information diffusion (e.g., Hong and Stein 1999; Hong, Torous, and Valkanov, 2007)) can cause returns in one country to predict returns in a trading-partner country. We draw inspiration from this literature and argue, given that (a) the U.S. is the largest trading partner of many countries and (b) investors focus on the U.S. market given its global presence and influence, information on macroeconomic fundamentals relevant for equity markets diffuses gradually from the U.S. market to foreign markets. This argument is consistent with lead-lag relationships found in portfolios of U.S. stocks (e.g., Lo and MacKinlay Brennan, Jegadeesh, and Swaminathan (1993), Chordia and (2000), Hou (2007), Cohen and Frazzini (2008). A key finding is that returns on large stocks lead returns of small-cap U.S. stocks. This granted, one can perceive the U.S. as a large cap market and the rest of the markets (country-specific) as relatively small-cap markets. In this international setting, therefore, the U.S. market should predict the rest of the relatively smaller markets.

[§] See also Narayan and Sharma (2014), Martín-Barragán, Ramos, and Veiga (2015), and Moya-Martinez, Ferrer-Lapena, and Escribano-Sotos, (2014).

[**] There are several less popular predictors of returns, which have only been introduced in this literature recently: for example, mutual funds (see Narayan, Narayan, and K.P, 2014), credit quality (Chava, Gallmeyer, and Park, 2015), and variance risk premia (Bollerslev, Marrone, Xu, and Zhou, 2014). We do not consider these factors in our study. We only consider the relatively more popular predictors of stock market returns from a macro perspective. Moreover, it is worthwhile to note that recent studies also consider stock-specific variables (such as financial ratios) as predictors of returns (see Narayan and Bannigidadmath, 2015; and Rapach, Strauss, and Zhou, 2010). We do not consider financial ratios simply because this data are not available for our sample of countries over the time period of analysis.

trading strategies that are flexible enough to allow for short-selling and borrowing. Lastly, we undertake a range of robustness tests to confirm the sensitivity or otherwise of our findings.

Our approaches lead to the following key findings. First, we discover strong evidence that U.S. stock excess returns and bilateral exchange rate returns predict stock market returns for over 90% of the countries in our sample, while oil price returns predict stock returns for around 40% of the countries in our sample. By comparison, the inflation rate turns out to be the weakest predictor, predicting returns for only around 10% of the countries.

Second, when we extend our analysis to out-of-sample tests, we find that while it is the U.S. stock excess returns-based forecasting model that beats the constant returns model for around 75% of the countries in our sample, the forecasting performance of the other three predictors declines substantially. On the whole, therefore, we observe that: (a) there is stronger evidence of predictability from in-sample tests than out-of-sample tests; (b) U.S. stock excess returns turn out to be the most successful predictor regardless of whether we use in-sample or out-of-sample tests; and (c) the results in (a) and (b) hold even when we impose sign restrictions in the spirit of Campbell and Thompson (2008).

Third, when we devise an economic significance analysis of the role of U.S. stock excess returns and exchange rate returns—the two most successful predictors—using a mean-variance utility function, we discover that: (a) profits for all nine country portfolios (including the 77-country portfolio) are maximized when the forecasting model is based on U.S. stock excess returns; and (b) profits are country portfolio dependent even though all countries are technology-investing, with the emerging market portfolio turning out to be the most profitable.

Our paper complements the stock return predictability literature in three ways. First, our study undertakes a comprehensive time-series stock return predictability test for 77 countries. Therefore, the evidence we provide is much broader and while it includes the U.S.

market it goes beyond the U.S. market to 76 other markets. In this regard, our paper provides a more global perspective on the role played by traditionally know predictors of returns—particularly exchange rate and the inflation rate—and the more recent predictors of returns such as U.S. returns and oil price returns. Second, we provide international evidence on the role of U.S. stock excess returns. Previously, Rapach *et al.* (2013) examine predictability for 11 industrialized countries using U.S. stock excess returns and find strong evidence of predictability. We add to this study over 60 additional countries and show that U.S. stock excess returns do not only predict returns of selected industrialized countries but have predictive power far beyond the 11 industrialized countries. This is not a trivial contribution of ours because by considering a large number of countries we give credence to Rapach et al.'s (2013: p. 1636) call for "… an international asset pricing model that explicitly incorporates the leading role of the U.S."

Third, our study can be seen as complementing the stock return—technology literature where the focus has been on either showing that technology predicts returns (see Hsu 2009 and Hirshleifer et al. (2013) or that technology facilitates stock market development (see Hsu and Huang, 2010). There are several recent theoretical work that supports the role played by technology in facilitating the development of the stock market; see Garleanu, Kogan, and Panageas (2012), Garleanu, Panageas and Yu (2012), Kogan and Papanikolaou (2014), and Papanikolaou (2011). A missing link in these studies is the lack of evidence of the economic significance of predictability. We address this through forecasting stock returns for each of the 77 countries and estimating investor profits using a mean-variance investor utility function. We, as a result, show that a portfolio of all 77 countries offers a mean-variance investor annualized profits in the 5.7% to 8.0% range whereas a portfolio of high technology investing emerging markets appears to be the most profitable with annualized profits in the 6.4% to 8.8% range. To the best of our knowledge, our paper is the first to show profitability of technology-investing countries.

Finally, our results survive a battery of robustness tests, such as: (a) our results hold regardless of the choice of in-sample and out-of-sample periods; (b) the evidence of predictability holds regardless of whether we use nominal variables or real variables; (c) results of mean-variance profits while sensitive to different levels of risk aversion still ensure that our main conclusion that U.S. returns-based models offer greatest profits hold; (d) mean-variance profits while sensitive to different in-sample and out-of-sample periods still hold in the sense that U.S. returns-based models offer the most profits; and (e) regardless of whether or not we allow for short-selling or borrowing the finding that U.S. stock returns-based models offer investors most profits holds.

We organize the balance of the paper as follows. Data and approaches are discussed in Section II. Section III presents and discusses the results, including robustness tests. The final section concludes with a summary of the paper.

II. DATA AND APPROACH

This section is about data. It has two specific aims. In the first part of this section, we explain our data set, its construction, and our approach. In the second part, we conclude this section with a preliminary description of our data set.

A. Data sources and approaches

Our data set contains 77 countries.[††] We have time-series monthly data. The start dates are noted in column 2 of Table I. The last date of data is December 2014; this is true for all

[††] According to the UN, there are a total of 202 countries in the world. Based on the World Intellectual Property Organisation's report on patents, there are around 170 countries which are active by way of patenting activities; see http://www.wipo.int/edocs/pubdocs/en/wipo_pub_941_2015-part1.pdf. Out of these, we have good quality time-series data (from 1981-2014) for 77 countries. Given this background, it is reasonable to claim that our

countries in our sample. Six variables are used in the empirical analysis. First, is the stock market price index for each of the 77 countries, which are in the U.S. dollar currency. The price index is used to compute log returns. The second data is the bilateral exchange rate. This rate is local currency vis-à-vis the U.S. dollar, such that an increase in the rate denotes a depreciation of the local currency. The exchange rate is used to compute log returns. The third variable is U.S. stock excess returns, which we proxy with returns of the S&P500 price index in excess of the U.S. three-month Treasury bill rate; again, like before, returns are log returns. The fourth variable is the U.S. West Texas Intermediate (WTI) crude oil price returns. The fifth variable is the consumer price index, which we use to compute the inflation rate for each country.[‡‡] All these data are downloaded from the *Global Financial Database*. The final variable is patents granted (utility patents—patents for invention) to residents, which is extracted from the U.S. Patent and Trademark Office.[§§]

Excess returns are computed by subtracting the U.S. three-month Treasury bill rate from each country's market returns. The U.S. stock excess returns, exchange rate returns, inflation, and crude oil returns are used as predictors of excess market returns. Annual time-series data on patents are used to categorize countries into different groups of technology investing countries. Specifically we have nine such groups, namely, all-77, high patent (top-50% of countries with the most patents), low patent (bottom-50% of the countries with the

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sample of 77 countries is 'technology-investing'. At least this is what we mean in our reference to "technology-investing".

[‡‡] Ideally, as one referee of this journal suggested, it would be fitting to also use industrial production growth rate as a predictor of returns given its success in the literature. We did consider it in our analysis but were constrained by the fact that monthly industrial production data are unavailable for many of the countries in our sample.

[§§] http://www.uspto.gov/web/offices/ac/ido/oeip/taf/h_at.htm. A number of features of this data on patents are relevant: (a) the origin of patent is determined by the country of residence of the first-named inventor; (b) patent can be corporate-owned, government-owned, or individual-owned; (c) in the case of multiple owners of the patent, the patent is attributed to the first-named assignee; and (d) patent ownership reflects ownership at the time of application and does not include any subsequent change(s) to ownership. We use data from the U.S Patent and Trade Office because this is the only database which has historical records on patents and it is the database that the literature (see Hsu, 2009 and the other studies cited earlier) has used. A better proxy for technological development would be the value of patents granted rather than the number of patents granted. However, there is no data on the value of patents granted. In this regard, while in using patents granted data our approach is consistent with the literature, this literature is not limitation-free, and we acknowledge this.

least patents), developed country (patents awarded to developed countries only), high patent developed country (top-50% of the developed countries with the most patents), low patent developed country (bottom-50% of the developed countries with the least patents), emerging country (patents awarded to all emerging countries only), high patent emerging country (top-50% of the emerging countries with the most patents), and low patent emerging country (bottom-50% of emerging countries with the least patents).

Using time-series predictive regression models, we test for excess stock market return predictability for all 77 countries. From this exercise, we identify predictors which are most successful in predicting returns, and then we use these predictors to forecast returns for each of the countries. We then utilize a mean-variance investor utility function to estimate investor utilities and profits. Following this, we categorize the individual countries into the various patent groups of countries and estimate equal-weighted mean-variance profits for each of the nine country portfolios.

B. Descriptive statistics

Table I contains descriptive statistics and the Appendix Tables A and B list down each of the 77 countries in our sample, their categorization based on patents awarded over the 1981-2014 period, and their stock price indexes. We begin the descriptive story by reading the results on excess returns. Several features are apparent here. First, there is a large variance in excess returns. For the 77 countries, the average excess returns is 2.37% per annum with a standard deviation of 6.06%. The excess returns for the 77 countries falls in the [-25.44, 14.64] percent range. Second, 23 countries have excess returns greater than 5% per annum. For these countries, excess returns fall in the [5.40, 14.64] percent per annum range. Third, there are 16 countries with negative annualized returns, in the [-0.12, -25.44] percent range. Fourth, Qatar has the highest annualized excess returns (14.64%) while Cyprus has the least excess returns (-25.44%). Fifth, the autoregressive conditional heteroskedastic Lagrange Multiplier (ARCH

LM) test reveals strong evidence that excess stock returns for most countries are heteroskedastic.

We now consider each of the predictor variables, beginning with the inflation rate. For 20 countries (26% of the sample), the inflation rate over the sample period, on average, has been at least 10% per annum.[***] Of these 20 countries, for 10 countries the inflation rate has been greater than 20% per annum. The countries with the highest inflation rate are also the most volatile as depicted by the standard deviation. We also notice that for over 50% of the countries in our sample, the inflation rate is heteroskedastic as revealed by the ARCH LM test.

Next we read descriptive statistics on exchange rate returns. The first thing to notice here is that most currencies (67/76) on average have depreciated against the U.S. dollar over the 1981 to 2014 period. The currencies which appreciated against the U.S. dollar are those of Austria, Canada, Germany, Japan, Malta, the Netherlands, Qatar, Singapore, Switzerland, and Taiwan. Moreover, there are over 50% of countries in our sample which have heteroskedastic exchange rate returns.

We conclude the descriptive story on predictors with a note on the oil price return series. The unit root null hypothesis (based on the ADF model) is rejected at the 1% level, suggesting that oil price returns is stationary. The first-order autoregressive coefficient turns out to be 0.18, implying low persistence. The ARCH LM test that examines the null hypothesis of 'no ARCH' is also rejected at the 1% level of significance, implying that oil price returns are heteroskedastic.

We next read the summary statistics on excess returns for each of the nine portfolios of countries. These statistics occupy Panel B (Table I). The portfolios are heterogeneous. Mean excess returns fall in the 1.2% to 3.0% range. The portfolio of high patent countries has

[***] These 20 countries are Argentina, Brazil, Bulgaria, Colombia, Egypt, Ghana, Iceland, Israel, Jamaica, Kazakhstan, Kenya, Mexico, Nigeria, Peru, Poland, Romania, Russia, Turkey, Ukraine, and Venezuela.

the highest mean excess returns while the portfolio of low patent emerging markets has the lowest excess returns. All portfolio excess returns are heteroskedastic as expected and have a non-normal distribution (unreported figures). A unit root test based on the augmented Dickey-Fuller model strongly rejects the unit root null hypothesis, rendering all excess returns strongly stationary. The first-order autoregressive coefficient falls in the 0.16 to 0.37 (unreported figures), suggesting return autocorrelation to the extent that between 16% and 37% of returns this month are dependent on returns in the previous month.

To conclude data description, we comment on mean yearly patents granted over the 1981 to 2014 period. The summary statistics on patents granted for each of the nine portfolios are reported in last five columns of Panel B (Table I). Several features are noteworthy. First, across all portfolios, the most number of patents granted is 17,894; and the mean monthly patents granted fall in the two to 8,543 range. Second, the developed country high-investing portfolio has twice as much patents as developed countries overall. Third, a portfolio of 50% of the developed countries with the least number of patents has less patents awarded than a portfolio of emerging countries and a portfolio of 50% of the emerging countries with most patents. On the whole, these statistics reveal the stark heterogeneity of the 77 countries which are technology-investing.

III. RESULTS

This section is divided into four parts. In the first part, we present evidence on whether or not the predictors we consider are exogenous. This is an important consideration in predictive regression models hence modelling it appropriately is imperative to mitigate against bias results on the null hypothesis of no predictability. In the second part, we provide a test of in-sample and out-of-sample predictability of excess returns. In the third part, we undertake an economic significance analysis. We conclude this section with a range of robustness tests.

A. Predictive regression model

To test for in-sample predictability, we use the Westerlund and Narayan (WN, 2012, 2015) time-series predictive regression framework that is based on the flexible generalized least squares estimator. The main appealing factor of the WN model is that it accounts for three of the key statistical features (persistency, endogeneity, and heteroscedasticity) of data.[†††] The model has the form:

$$r_t = \alpha + \beta_0 P_{t-1} + \varepsilon_t^r \tag{1}$$

Here r_t is the country stock market excess returns and P_{t-1} is the one-period lagged predictor variable. We store the residuals, ε_t^r. We then run the following first-order autoregressive model of the predictor variable using OLS:

$$P_t = \alpha + \beta_1 P_{t-1} + \varepsilon_t^p \tag{2}$$

We again store the residuals, ε_t^p. We then regress ε_t^r on ε_t^p and judge the statistical significance of the slope coefficient as a measure of endogeneity, as follows:

$$\varepsilon_t^r = \beta_2 \varepsilon_t^p + \mu_t \tag{3}$$

If the null hypothesis that the slope coefficient in Equation (3) is zero is rejected then this is taken as evidence of endogeneity.

The results—slope coefficient and the p-value used to take a decision regarding the null hypothesis (from Equation (1))—are reported in Table II. We find strong evidence that most predictors for most countries are not exogenous—that is, endogeneity is indeed an issue. For example, when using the exchange rate returns predictor, the null hypothesis that the slope coefficient is zero is rejected for 70 countries (more than 90% of the countries in our sample). The only countries where endogeneity is not a problem when using exchange rate returns as a predictor are Egypt, Ghana, Kazakhstan, Oman, Qatar, Saudi Arabia, and

[†††] For these reasons, the WN predictive regression framework is widely used in applications—see Narayan and Bannigidadmath (2015), Phan, Sharma, and Narayan (2015), Narayan and Sharma (2015), Sharma (2016).

Vietnam. Similarly, when using U.S. stock excess returns as a predictor for all countries, except Ghana, Jamaica, and Sri Lanka, endogeneity is an issue. Consider now when crude oil price returns are used as a predictor. In this case, the null hypothesis that the slope coefficient is zero cannot be rejected for 20 countries; therefore, while for 20 countries endogeneity is not an issue, for the remaining 57 countries it is an issue. The inflation rate, by comparison, is least of a concern when it comes to endogeneity as the null hypothesis that the slope coefficient is zero is only rejected for 10 countries, suggesting that for the bulk of the countries inflation rate is an exogenous predictor of stock excess returns.

The implication from these results is clear. Endogeneity is an issue, as much as heteroscedasticity is (see Section II), therefore these issues need to be accounted for in predictive regression models. Motivated by these statistical issues, we use the bias-adjusted flexible generalized least squares (FGLS) estimator of the null hypothesis of no predictability proposed by Westerlund and Narayan (2015).

B. In-sample predictability

The bias-adjusted FGLS estimator of β proposed by Westerlund and Narayan (2015) is based on making Equation (1) conditional on Equation (3). The result of this is that it removes the effect of endogeneity and persistency. The model is well-known and for further details we refer interested readers to papers such as Narayan and Bannigidadmath (2015), and Sharma (2016).

The results are reported in Table III. We find that when using U.S. stock excess returns as a predictor the null hypothesis of no predictability is rejected for 96% of the countries. In other words the only countries for which U.S. stock excess returns do not predict returns are Jordan, the Slovak Republic, and Tunisia. The second most successful predictor is exchange rate returns for which the null hypothesis of no predictability is rejected for 95% of the countries in our sample. The only countries for which there is no evidence of predictability are Latvia, Oman, Peru, and Qatar. Crude oil price returns have predictive ability but only for 32 countries (42% of countries in our sample) and inflation rate turns out to be the weakest predictor of excess returns, only predicting returns for 13% of countries in our sample. In Panel C (Table III), we summarise results by grouping countries into high/low patent countries (same characterization of countries as discussed in Section II.A). We see the same patterns in predictability as found earlier. In other words, exchange rate returns and U.S. excess returns are the most successful predictors followed by oil prices while inflation does not matter. The implication is that even when treating patent intensity of countries by level of country development, the role of predictors appear robust.

C. Out-of-sample evidence

This section reports out-of-sample evaluations of the importance of predictors in forecasting excess returns vis-à-vis a constant returns model. The forecasting regression model is based on Equation (4) but uses only 50% of the sample as an in-sample period to generate recursive forecasts of excess returns for the remaining 50% of the sample. We report the out-of-sample (OR^2) proposed by Fama and French (1989), which examines the difference in the mean squared errors from the competition model and the constant returns model. The Clark and West (2007) MSFE-adjusted test statistic, denoted with an asterisk, examines the null hypothesis that the $OR^2 = 0$ against the alternative that $OR^2 > 0$. The results based on return forecasts from each of the four predictors are reported in Table IV. The main findings can be summarized as follows. First, when U.S. returns are used to forecast excess returns, for 61% of the countries the $OR^2 > 0$ suggesting that the U.S. returns-based forecasting model beats the constant returns forecasting model for these countries. When the MSFE-adjusted test statistic is used to judge the statistical significance of the OR^2, in around 30% of the countries the null is rejected. Exchange rate returns- and oil price return-based forecasting models, by comparison, only beat the constant returns model for 25% of the countries in our sample. Meanwhile, inflation is the weakest, beating the constant returns model in only around 14% of the countries.

In Table V we report the same out-of-sample statistics but this time the statistics are generated by imposing the Campbell and Thompson (2008) sign restrictions. The sign restriction is simple; it amounts to treating any negative forecasts as zero. The motivation for this approach is based on the Campbell and Thompson finding that sign restrictions deliver better out-of-sample forecasting performance than a forecasting model that does not impose any sign restrictions. We find stronger evidence of out-of-sample forecasting performance of all our four models vis-à-vis the constant returns model when we do impose sign restrictions. The U.S. returns-based forecasting model beats the constant returns model in 75% of countries in our sample, while inflation, crude oil, and exchange rate returns-based forecasting models beat the constant returns model in 35%, 36% and 37% of countries, respectively. Even the predictor inflation rate, which performed extremely poorly earlier, with sign restrictions the performance of the inflation-based forecasting model improves substantially.

D. Mean-variance investor profits

In this section, we compute utility for a mean-variance investor on a real time basis, who has the following utility function:

$$E_t\{r_{t+1}\} - \frac{1}{2}\gamma Var_t\{r_{t+1}\} \tag{8}$$

Such that for a given portfolio weight of π_{t+1} for the risky asset, the utility simply becomes:

$$r_{f,t+1} + \pi_{t+1} E_t\{r_{t+1}\} - \frac{1}{2}\gamma \pi_{t+1}^2 + Var_t\{r_{t+1}\} \tag{9}$$

Where r_{t+1} is the stock return, $r_{f,t+1}$ is the risk-free rate of return, Var_t is the rolling variance of the risky asset, γ is the risk aversion factor, and the portfolio weight in period t+1 is computed as follows:

$$\pi_{t+1}^* = \frac{E_t\{r_{t+1}\} - r_{f,t+1}}{\gamma Var_t\{r_{t+1}\}} \tag{10}$$

Apart from restricting the portfolio weight to between 0 and 1, we also, following Campbell and Thompson (2008), constrain the portfolio weight on stocks to lie between -50% and 150% each month. In generating the portfolio weight, we need to have a forecast of returns and its variance. Our approach is to use 50% of the sample as an in-sample period and generate recursive forecasts of excess returns for the remaining 50% of the sample. The variance is computed using a 60-month rolling window of stock returns, consistent with Campbell and Thompson (2008) and others. Our portfolio is a two-asset portfolio, where one is a risky asset and the other is a risk-free asset. The portfolio weight is used to decide the proportion of a dollar to be invested in the risky asset (which is the stock market) and the risk-free asset (which is the three-month bill rate). As is common in this mean-variance setup, we make two assumptions: (a) investors only use public information to forecast the one-period ahead excess returns; and (b) investors rebalance their portfolio once a month.

Using the portfolio weights derived for a mean-variance investor, we can compute dynamic profits (PR) over time as follows:

$$PR_t = \pi_{t+1}^* \times r_{t+1} + (1 - \pi_{t+1}^*) r_{f,t+1} \tag{11}$$

We only generate profits based on U.S. stock excess returns and exchange rate returns as predictors because these are the predictors and forecasting models that performed best. The average annualized profits are reported in Table VI. The profits are equal-weighted country averages for each of the nine portfolios of countries, including a portfolio of all 77 countries. Several results are in order and we summarize these here. Based on using U.S. stock excess returns forecasting model, we observe the following. First, the annualized portfolio profits fall in the 5.0% to 6.4% range. Second, when a portfolio of all 77 countries is considered annualized profits are 5.7%. Third, portfolios of high patent emerging (6.4%), emerging (5.9%), and low patent countries (5.8%) have higher annualized profits compared to a portfolio of all 77 countries. Fourth, when we consider the exchange rate returns-based forecasting model, again all portfolios are profitable with annualized profits in the 2.3% to 5.0% range. Finally, in a comparative sense, annualized profits based on the U.S. returns forecasting model are almost 3% more than profits from a forecasting model that uses exchange rate returns as a predictor.

E. Robustness test

We undertake a range of robustness tests to confirm our results. First, we check whether our out-of-sample forecasting results based on a 50% (50%) in-sample (out-of-sample) period are sensitive to other in-sample and out-of-sample combinations to the extent that they change our main conclusions. In this regard, we consider 30% (70%) and 70% (30%) in-sample (out-of-sample) periods. The results reported in Table VII reveal that our main story that U.S. stock excess returns are the best predictor holds regardless of the in-sample and out-of-sample periods chosen.

Our second robustness test relates to the choice between real and nominal predictors. Our results reported so far are based on nominal U.S. returns, nominal exchange rate returns, and nominal oil price returns. Indeed in our empirical set up the dependent variable is also nominal country excess returns. We re-run all in-sample and out-of-sample forecasting models using real variables and report the results in Table VIII. We still observe that: (a) in-sample evidence of predictability is stronger than out-of-sample results; and (b) U.S. returns, in both in-sample and forecasting models, are the most power predictor of country excess returns followed by exchange rate returns, oil price returns, and inflation.

Our third robustness test deals with the sensitivity of the profitability results to different risk aversion parameters. Our results so have been based on the assumption that the investor undertakes a medium level of risk. We test how much those profits vary when this assumption changes to one where an investor undertakes a high level of risk (risk aversion factor of 12) and a low level of risk (a risk aversion factor of 3). The profits based on these two risk aversion factors for portfolios formed on zero short-selling and borrowing and 50% short-selling and borrowing are reported in Table IX. Consider profits based on using the U.S. returns forecasting model for the all-77 country portfolio. When the risk aversion factor was six profit was 5.7% per annum, and when the risk aversion factor is three and 12, annualized profits turn out to be 5.9% and 5.1%, respectively. Similarly, when we consider the most profitable portfolio (high patent emerging country) with a risk aversion factor of six, annualized profit was 6.4% per annum, and with risk aversion factors of three and 12 annualized profits are 6.8% and 5.5% per annum, respectively. A similar trend in results is noticed when using the exchange rate returns-based forecasting model. The main message is this: risk aversion parameters matter for profits—that is, profits are indeed, and as expected, sensitive to different levels of risks. However, not only the profitability of portfolios holds but the relative importance of U.S. returns over the exchange rate returns as a predictor also holds in that profits are maximized when using the U.S. returns-based forecasting model.

We also examine the sensitivity of profits to different risk aversion factors when forecasting models are based on 30% and 70% in-sample periods. The results are remarkably consistent regardless of the choice of the in-sample period. Consider, for instance, the U.S. returns-based forecasting model. Profits obtained for the all-77 country portfolio when 30%

is used as an in-sample period fall in the 4.4% to 5.0% range (across the three risk aversion factors). When using 70% as an in-sample period, profits fall in the 4.5% to 5.1% per annum range. This compares with a profit range of 5.1% to 5.9% per annum when the in-sample period is set to 50%. Similar consistency in the range for profits is found when 50% short-selling and borrowing is allowed. Profits though, as expected, are higher when short-selling and borrowing are allowed and, as discovered earlier, profits are sensitive to different levels of investor risk aversion. A similar trend in profits holds for the other portfolios. On the whole, as discovered earlier, profits obtained from exchange rate returns-based forecasting models are relatively less compared to profits from the U.S. returns-based forecasting model. In other words, the popularity of the U.S. returns-based model holds regardless of the choice of the (a) in-sample periods, (b) risk aversion parameters, and (c) restrictions on short-selling and borrowing.

IV. CONCLUDING REMARKS

This paper builds on earlier literature on stock return predictability at the country level. The main innovation is that we consider 77 countries which are technology-investing in the sense that they have a historical record of patents awarded over the period 1981 to 2014, allowing us to: (a) test whether widely accepted predictors, such as U.S. stock excess returns, exchange rate returns, inflation rate, and oil price returns, predict and forecast country excess returns better than a benchmark constant returns model; and (b) form several country portfolios on the basis of technology development, including portfolios of developed and emerging countries.

Our empirical results unravel several new insights on the technology-investing countries. First, we discover that U.S. stock excess returns is a strong predictor of country stock excess returns, both in in-sample and out-of-sample tests, followed by exchange rate returns. Oil price returns and inflation do predict country stock excess returns, but for at best around 35% of the countries in our sample. Second, a mean-variance investor investing in a portfolio of emerging countries is likely to maximize profits. Moreover, our results suggest that the role of U.S. stock excess returns is not only statistically important (in terms of predictability and forecasting ability) but also when using U.S. returns to form mean-variance profits, on average profits are around 3% per annum higher compared to when using exchange rate returns based models.

The key implication of our empirical analysis is that while technology-investing countries have predictable and, therefore, profitable stock returns, profits are driven by different geographical location of technology-investing countries and by the level of country development. This finding adds to our understanding of asset pricing and the resulting portfolio choice amongst countries that are technology-investing.

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Appendix A: List of countries by portfolio

This table lists the 77 countries that make up our empirical analysis. The countries are also categorized into various country groupings based on patents granted. Specifically, we have the high patent (top-50% of countries with the most patents), low patent (bottom-50% of the countries with the least patents), developed country (patents awarded to developed countries only), high patent developed country (top-50% of the developed countries with the most patents), low patent developed country (bottom-50% of the developed countries with the least patents), emerging country (patents awarded to all emerging countries only), high patent emerging country (top-50% of the emerging countries with the most patents), and low patent emerging country (bottom-50% of emerging countries with the least patents).

Full (All-77)		Developed		Emerging	
High	Low	High	Low	High	Low
Argentina	Bulgaria	Australia	Denmark	Argentina	Colombia
Australia	Chile	Austria	Greece	Brazil	Croatia
Austria	Colombia	Belgium	Hong Kong	Bulgaria	Cyprus
Belgium	Croatia	Canada	Iceland	Chile	Egypt
Brazil	Cyprus	Finland	Ireland	China	Indonesia
Canada	Egypt	France	Latvia	Czech Republic	Jamaica
China	Iceland	Germany	Lithuania	Hungary	Jordan
Czech Republic	Indonesia	Israel	Luxembourg	India	Kenya
Denmark	Jamaica	Italy	Malta	Kuwait	Morocco
Finland	Jordan	Japan	New Zealand	Malaysia	Oman
France	Kenya	South Korea	Norway	Mexico	Pakistan
Germany	Kuwait	Sweden	Portugal	Netherlands	Peru
Greece	Latvia	Switzerland	Singapore	Philippines	Sri Lanka
Hong Kong	Lithuania	United Kingdom	Slovakia	Poland	Tunisia
Hungary	Malta	United States	Spain	Romania	Ghana
India	Morocco			Russia	Kazakhstan
Ireland	Oman			Slovenia	Macedonia
Israel	Pakistan			South Africa	Mauritius
Italy	Peru			Taiwan	Namibia
Japan	Philippines			Thailand	Nigeria
Luxembourg	Portugal			Turkey	Qatar
Malaysia	Romania			Venezuela	Serbia
Mexico	Slovakia			Saudi Arabia	Vietnam
Netherlands	Slovenia			Ukraine	
New Zealand	Sri Lanka				
Norway	Thailand				
Poland	Tunisia				
Russia	Turkey				
Singapore	Ghana				
South Africa	Kazakhstan				
South Korea	Macedonia				
Spain	Mauritius				
Sweden	Namibia				
Switzerland	Nigeria				
Taiwan	Qatar				
United Kingdom	Serbia				
United States	Ukraine				
Venezuela	Vietnam				
Saudi Arabia					

Appendix B: List of stock price index by country

This table lists the 77 countries that make up our empirical analysis and in column 2 notes the stock price index associated with each country.

Country	Stock Price Index
Argentina	Buenos Aires SE General
Australia	S&P/ASX 300
Austria	Austria Wiener Boersekammer
Belgium	Bel 20
Brazil	Brazil Bovespa
Bulgaria	Bulgaria SE SOFIX
Canada	S&P/TSX Composite
Chile	Chile Santiago SE General
China	Shanghai Se Composite
Colombia	Colombia IGBC General
Croatia	Croatia CROBEX
Cyprus	Cyprus General
Czech Republic	Prague SE PX
Denmark	OMX Copenhagen All
Egypt	Egypt EGX 30
Finland	OMX Helsinki All
France	France CAX 40
Germany	FAZ General
Ghana	Ghana Composite GSE-CI
Greece	Athens Se General
Hong Kong	Hang Seng
Hungary	Budapest
Iceland	OMX Iceland All Share
India	S&P BSE (Sensex) 30 Sensitive
Indonesia	IDX Composite
Ireland	Ireland ISEQ Overall
Israel	Tel Aviv All Share
Italy	Banca Commerciale Italiana
Jamaica	Jamaica Stock Exchange All Share Composite
Japan	Nikkei 225 Stock Average
Jordan	Jordan AFM General
Kazakhstan	Kazakhstan SE KASE
Kenya	Nairobi SE
Korea South	Korea SE Composite
Kuwait	Kuwait KIC General
Latvia	OMX Riga
Lithuania	OMX Vilnius
Luxembourg	Luxembourg SE LUXX
Macedonia	Macedonian SE MBI 10
Malaysia	FTSE Bursa Malaysia KLCI
Malta	Malta SE MSE
Mauritius	Mauritius SE SEMDEX
Mexico	Mexico IPC
Morocco	Morocco All Share
Namibia	FTSE/Namibia Overall
Netherlands	Netherlands All Share
New Zealand	New Zealand SE All Share
Nigeria	Nigeria All Share
Norway	Oslo SE All Share
Oman	Oman Muscat Securities Market
Pakistan	Pakistan Karachi SE100

Peru	Lima S&P/BVL Peru General
Philippines	Manila SE Composite
Poland	Warsaw General
Portugal	Oporto PSI-20
Qatar	QE All Share
Romania	Romania BET
Russia	Russia RTS
Saudi Arabia	Saudi Tadawul All Share
Serbia	Belgrade BELEX Line
Singapore	Singapore FTSE All Share
Slovakia Republic	Slovakia SAX 16
Slovenia	Slovenian Blue Chip
South Africa	FTSE/JSE All Share
Spain	Madrid SE General
Sri Lanka	Colombo SE All Share
Sweden	OMX Stockholm
Switzerland	Switzerland Price Index
Taiwan	Taiwan SE Capitalization Weighted Index
Thailand	Bangkok S.E.T.
Tunisia	Tunisia TUNINDEX
Turkey	BIST National 100
Ukraine	Ukraine PFTS
United Kingdom	FTSE All Share
United States	S&P 500 Composite
Venezuela	Caracas SE General
Vietnam	Hochiminh SE Vietnam

Table I: Descriptive statistics

This table reports, in Panel A, selective descriptive statistics of variables, namely, the stock index returns in excess of US three-month Treasury bill rate, the inflation rate, and the exchange rate returns (local currency vis-à-vis the U.S. dollar) for each of the 77 countries. The statistics include the mean value, its standard deviation, and the ARCH (1) p-values that test the null hypothesis that there is no ARCH. The sample start date for each country is reported in the second column while the end date is December 2014 and is common to all countries. In Panel B, we report selected descriptive statistics for portfolio excess returns and patents granted. There are nine portfolios sorted by patent awarded to residents. The portfolios are the all-77, high patent (top-50% of countries with the most patents), low patent (bottom-50% of the countries with the least patents), developed country (patents awarded to developed countries only), high patent developed country (top-50% of the developed countries with the most patents), low patent developed country (bottom-50% of the developed countries with the least patents), emerging country (patents awarded to all emerging countries only), high patent emerging country (top-50% of the emerging countries with the most patents), and low patent emerging country (bottom-50% of emerging countries with the least patents).

Panel A: Countries										
Countries	Start date	U.S. excess returns			Inflation rate			Exchange rate returns		
		Mean	SD	ARCH	Mean	SD	ARCH	Mean	SD	ARCH
Argentina	Jan-81	0.13	16.16	0.00	4.76	10.28	0.00	4.87	14.22	0.00
Australia	Jan-81	0.03	7.05	0.63	0.33	0.33	0.00	0.09	3.39	0.04
Austria	Jan-81	0.14	6.91	0.00	0.21	0.38	0.26	-0.05	3.19	0.22
Belgium	Feb-90	0.07	5.83	0.00	0.22	1.45	0.92	0.01	3.20	0.14
Brazil	Jan-81	0.57	18.68	0.02	6.45	29.24	0.68	6.24	10.86	0.00
Bulgaria	Nov-00	0.99	10.57	0.00	1.78	8.86	0.00	1.83	13.53	0.31
Canada	Jan-81	0.09	5.67	0.02	0.24	0.38	0.05	-0.01	2.02	0.00
Chile	Feb-87	0.64	6.60	0.04	0.75	0.95	0.00	0.67	3.40	0.90
China	Feb-91	0.82	13.40	0.27	0.20	0.76	0.00	0.35	2.68	0.93
Colombia	Jan-81	0.30	8.86	0.06	1.11	1.81	0.14	0.94	2.74	0.00
Croatia	Feb-97	0.00	9.36	0.00	0.19	1.16	0.99	3.65	8.96	0.00
Cyprus	Oct-04	-2.12	15.39	0.08	0.27	0.94	0.04	0.08	3.36	0.01
Czech Republic	May-94	-0.09	8.42	0.00	0.41	1.34	0.99	0.36	6.90	0.92
Denmark	Jan-81	0.46	5.65	0.00	0.25	0.42	0.75	0.01	3.15	0.17
Egypt	Feb-98	0.58	9.95	0.13	0.87	1.72	0.00	0.60	3.21	0.24
Finland	Jan-81	0.45	7.57	0.00	0.25	0.39	0.47	0.06	3.18	0.01
France	Aug-87	0.08	6.31	0.00	0.23	0.33	0.00	0.04	3.17	0.85
Germany	Jan-81	0.21	6.38	0.00	0.16	0.33	0.32	-0.05	3.20	0.23
Ghana	Feb-11	0.08	6.01	0.27	1.27	1.68	0.11	2.35	12.63	0.95
Greece	Jan-81	-0.26	10.12	0.02	0.70	1.35	0.04	0.44	3.30	0.68
Hong Kong	Jan-81	0.21	8.47	0.61	0.38	0.77	0.06	0.10	0.93	0.00
Hungary	Feb-91	0.26	10.11	0.70	0.75	0.90	0.18	0.49	4.03	0.04
Iceland	Jan-93	-0.15	11.12	0.00	0.93	1.42	0.00	0.74	3.89	0.07
India	Jan-81	0.40	8.58	0.07	0.65	4.87	0.53	0.51	2.10	0.84
Indonesia	May-83	0.03	11.17	0.01	0.69	1.89	0.29	0.73	6.09	0.00
Ireland	Jan-81	0.21	6.51	0.00	0.30	0.77	0.62	0.05	3.12	0.68
Israel	Jan-81	0.34	7.25	0.65	1.75	3.70	0.00	1.53	4.29	0.01
Italy	Jan-81	-0.06	7.35	0.00	0.37	0.37	0.00	0.13	3.13	0.03
Jamaica	Jan-81	0.33	9.00	0.00	1.20	1.32	0.15	1.03	4.47	0.38
Japan	Jan-81	-0.02	6.44	0.00	0.07	0.43	0.72	-0.13	3.28	0.15
Jordan	Jan-81	-0.16	6.54	0.00	0.40	1.62	0.79	0.20	2.99	0.00
Kazakhstan	Apr-07	-1.58	10.77	0.54	0.87	1.02	0.00	2.65	16.88	0.60
Kenya	Jan-81	-0.34	6.87	0.00	0.97	1.71	0.04	0.61	3.47	0.00
Korea South	Jan-81	0.21	9.54	0.00	0.34	0.51	0.00	0.12	3.43	0.00
Kuwait	Jan-95	0.33	5.03	0.00	0.25	0.62	0.00	0.02	1.31	0.00
Latvia	Feb-00	0.70	7.57	0.85	0.30	2.25	0.99	1.14	15.94	0.96
Lithuania	Jan-00	0.79	8.25	0.00	0.24	1.00	0.04	1.46	16.15	0.76
Luxembourg	Jan-81	0.24	6.67	0.00	0.22	0.54	0.00	0.01	3.21	0.15
Macedonia	Jan-05	0.32	11.67	0.31	-0.01	1.13	0.06	0.77	5.51	0.84
Malaysia	Jan-81	-0.10	8.37	0.00	0.24	0.41	0.34	0.11	1.90	0.00

Malta	Jan-96	0.28	5.59	0.00	0.17	0.64	0.59	0.00	2.64	0.01
Mauritius	Aug-89	0.46	5.41	0.00	0.44	2.67	0.00	0.32	2.58	0.53
Mexico	Jan-81	0.57	13.13	0.00	1.77	2.24	0.00	1.58	7.11	0.47
Morocco	Feb-02	0.68	5.28	0.09	0.31	0.85	0.10	0.16	3.02	0.00
Namibia	Oct-10	-0.38	6.69	0.83	0.56	0.50	0.45	0.67	4.49	0.00
Netherlands	Jan-81	0.24	5.78	0.00	0.18	0.41	0.81	-0.04	3.18	0.24
New Zealand	Jan-81	0.00	6.86	0.65	0.36	0.47	0.00	0.05	3.60	0.59
Nigeria	Feb-00	0.51	7.88	0.00	1.43	2.18	0.44	1.43	9.84	1.00
Norway	Jan-81	0.43	7.43	0.00	0.29	0.49	0.52	0.09	3.13	0.01
Oman	Nov-96	0.36	6.41	0.00	0.16	0.60	0.00	0.03	0.57	0.96
Pakistan	Jan-81	0.33	8.59	0.00	0.66	0.79	0.13	0.57	2.09	0.01
Peru	Jan-81	0.80	14.55	0.01	4.42	11.24	0.00	3.92	11.60	0.00
Philippines	Jan-81	0.01	9.70	0.40	0.65	1.02	0.00	0.44	3.55	0.17
Poland	May-91	0.71	12.13	0.00	1.89	5.02	0.00	1.52	7.20	0.00
Portugal	Jan-81	-0.03	8.62	0.00	0.57	0.80	0.02	0.28	3.18	0.96
Qatar	Feb-07	1.22	7.51	0.00	0.07	0.42	0.07	0.00	0.28	0.00
Romania	Oct-97	0.02	11.94	0.20	1.59	2.63	0.00	1.87	8.68	0.92
Russia	Oct-95	0.75	14.48	0.23	1.47	2.59	0.09	2.76	16.25	0.96
Saudi Arabia	Nov-98	0.71	7.32	0.00	0.18	0.36	0.01	0.03	0.26	0.76
Serbia	Jan-07	-1.30	10.97	0.10	-0.04	1.06	0.72	16.58	85.67	0.00
Singapore	Jan-81	-0.01	6.96	0.01	0.16	0.46	0.00	-0.11	1.55	0.00
Slovak Republic	Oct-93	0.04	9.33	0.00	0.39	0.72	0.91	0.38	6.76	0.93
Slovenia	Apr-06	-0.32	7.50	0.05	0.33	0.67	0.24	2.73	7.61	0.01
South Africa	Jan-81	0.01	8.04	0.01	0.72	0.55	0.00	0.67	4.50	0.00
Spain	Jan-81	0.27	6.97	0.00	0.38	0.54	0.25	0.14	3.12	0.01
Sri Lanka	Feb-85	0.45	7.51	0.14	-0.05	17.20	0.96	0.50	1.32	0.00
Sweden	Jan-81	0.51	6.83	0.00	0.27	0.55	0.10	0.14	3.30	0.06
Switzerland	Jan-81	0.31	5.01	0.00	0.14	0.37	0.89	-0.14	3.40	0.00
Taiwan	Jan-81	0.35	10.30	0.00	0.15	0.89	0.06	-0.03	1.58	0.00
Thailand	Jan-81	0.12	9.28	0.01	0.26	0.77	0.59	0.12	2.78	0.03
Tunisia	Jan-98	0.38	4.26	0.63	-0.21	3.17	0.72	0.37	2.54	0.51
Turkey	Feb-88	0.20	15.79	0.77	2.74	2.53	0.10	2.49	4.52	0.00
Ukraine	Dec-97	-0.45	13.95	0.00	3.11	17.35	0.31	3.94	14.83	0.86
United Kingdom	Jan-81	0.13	5.25	0.02	0.32	0.46	0.11	0.11	2.96	0.01
United States	Jan-81	0.29	4.40	0.01	0.25	0.33	0.00	NA	NA	NA
Venezuela	Jan-81	0.92	12.43	0.00	2.22	1.85	0.71	1.80	7.41	0.71
Vietnam	Aug-00	0.50	19.82	0.16	0.55	0.92	0.53	2.84	20.84	0.81

Panel B:Patent-based portfolios

Portfolios	Start date	Excess returns			Patents granted				
		Mean	SD	ARCH	Mean	SD	Median	Maximum	Minimum
Full (all-77)	Jan-81	0.21	4.56	0.00	1,776	822	1,660	3,901	735
Full High	Jan-81	0.25	5.04	0.00	3,501	1,619	3,273	7,679	1,449
Full Low	Jan-81	0.12	4.52	0.00	5	5	3	23	1
Developed	Jan-81	0.19	4.80	0.00	4,323	1,890	4,074	9,110	1,852
Developed High	Jan-81	0.20	4.79	0.00	8,543	3,701	8,051	17,894	3,679
Developed Low	Jan-81	0.17	5.16	0.00	105	80	80	326	24
Emerging	Jan-81	0.20	4.85	0.00	150	145	93	576	22
Emerging High	Jan-81	0.27	5.89	0.04	291	283	180	1,120	42
Emerging Low	Jan-81	0.10	4.43	0.00	2	2	2	8	0.5

Table II: Endogeneity test results

This table reports results on endogeneity based on a regression of residuals from the OLS predictive regression model on residuals from the OLS first-order autoregressive predictor regression model. The resulting slope coefficient is reported together with the p-value testing the null hypothesis that the slop coefficient is zero.

Countries	Exchange rate returns		Inflation rate		U.S. excess returns		Crude oil returns	
	Coeff.	p-value	Coeff.	p-value	Coeff.	p-value	Coeff.	p-value
Argentina	-0.41	0.00	-0.72	0.00	0.75	0.00	0.28	0.00
Australia	-1.52	0.00	-2.42	0.13	0.96	0.00	0.17	0.00
Austria	-1.04	0.00	1.13	0.22	0.64	0.00	0.12	0.00
Belgium	-0.99	0.00	0.02	0.90	0.92	0.00	0.06	0.08
Brazil	-0.82	0.00	-0.04	0.18	1.40	0.00	0.18	0.07
Bulgaria	-1.23	0.00	0.03	0.97	1.10	0.00	0.36	0.00
Canada	-1.96	0.00	0.17	0.83	0.98	0.00	0.16	0.00
Chile	-1.29	0.00	-0.67	0.30	0.65	0.00	0.08	0.05
China	-1.13	0.00	0.41	0.58	0.34	0.07	0.07	0.45
Colombia	-1.34	0.00	0.06	0.82	0.47	0.00	0.04	0.43
Croatia	-0.60	0.00	-0.06	0.91	1.13	0.00	0.29	0.00
Cyprus	-2.36	0.00	0.20	0.90	1.84	0.00	0.48	0.00
Czech Republic	-1.32	0.00	-0.81	0.37	0.97	0.00	0.20	0.00
Denmark	-0.89	0.00	-1.37	0.05	0.69	0.00	0.13	0.00
Egypt	-0.42	0.30	0.93	0.23	0.84	0.00	0.29	0.00
Finland	-0.83	0.00	-0.51	0.61	0.86	0.00	0.11	0.01
France	-0.84	0.00	-0.08	0.95	1.03	0.00	0.06	0.14
Germany	-0.86	0.00	0.74	0.45	0.89	0.00	0.06	0.11
Ghana	-0.48	0.12	0.29	0.74	0.16	0.54	-0.06	0.59
Greece	-1.17	0.00	-0.20	0.59	0.84	0.00	0.11	0.04
Hong Kong	-3.01	0.00	0.21	0.71	1.00	0.00	0.08	0.07
Hungary	-1.31	0.00	0.99	0.23	1.38	0.00	0.21	0.00
Iceland	-1.34	0.00	-4.19	0.00	0.91	0.00	0.40	0.00
India	-1.37	0.00	0.09	0.30	0.49	0.00	0.22	0.00
Indonesia	-1.21	0.00	-0.48	0.12	0.80	0.00	0.11	0.08
Ireland	-0.80	0.00	-0.03	0.95	0.90	0.00	0.04	0.29
Israel	-0.94	0.00	-0.45	0.01	0.59	0.00	0.08	0.04
Italy	-1.05	0.00	1.02	0.53	0.81	0.00	0.10	0.01
Jamaica	-0.96	0.00	-0.68	0.15	0.09	0.35	0.11	0.02
Japan	-0.83	0.00	0.07	0.93	0.63	0.00	0.07	0.05
Jordan	-1.11	0.00	-0.12	0.56	0.16	0.03	0.04	0.27
Kazakhstan	-0.34	0.28	1.54	0.36	1.45	0.00	0.39	0.00
Kenya	-1.11	0.00	0.02	0.92	0.34	0.00	0.02	0.51
Korea South	-1.74	0.00	-0.22	0.82	0.87	0.00	0.15	0.00
Kuwait	-2.93	0.00	-0.03	0.96	0.34	0.00	0.10	0.00
Latvia	-0.49	0.00	-0.11	0.62	0.68	0.00	0.19	0.00
Lithuania	-1.12	0.00	-0.23	0.73	0.82	0.00	0.28	0.00
Luxembourg	-1.06	0.00	-0.78	0.21	0.73	0.00	0.12	0.00
Macedonia	-1.46	0.00	0.24	0.80	0.94	0.00	0.44	0.00
Malaysia	-2.01	0.00	0.92	0.38	0.80	0.00	0.12	0.01
Malta	-1.04	0.00	-0.61	0.36	0.36	0.00	0.12	0.00
Mauritius	-1.07	0.00	0.02	0.82	0.32	0.00	0.11	0.00
Mexico	-1.16	0.00	-2.75	0.00	1.14	0.00	0.13	0.07
Morocco	-1.02	0.00	0.75	0.20	0.41	0.00	0.10	0.03
Namibia	-1.26	0.00	0.10	0.96	1.24	0.00	0.36	0.00
Netherlands	-0.75	0.00	-1.21	0.10	0.94	0.00	0.12	0.00
New Zealand	-1.19	0.00	0.43	0.73	0.69	0.00	0.09	0.02
Nigeria	-1.13	0.00	0.12	0.74	0.42	0.00	0.17	0.00
Norway	-1.18	0.00	0.03	0.97	1.02	0.00	0.28	0.00
Oman	-0.43	0.84	0.38	0.60	0.22	0.02	0.12	0.00
Pakistan	-1.48	0.00	-0.55	0.32	0.19	0.05	0.04	0.39

Peru	-0.52	0.00	-0.23	0.00	0.59	0.00	0.24	0.00
Philippines	-1.36	0.00	-0.89	0.12	0.70	0.00	-0.04	0.41
Poland	-1.32	0.00	0.44	0.58	1.45	0.00	0.18	0.03
Portugal	-1.12	0.00	-1.05	0.12	0.65	0.00	0.06	0.20
Qatar	5.29	0.77	2.83	0.08	0.91	0.00	0.28	0.00
Romania	-1.74	0.00	0.71	0.46	1.02	0.00	0.25	0.00
Russia	-1.26	0.00	-1.52	0.00	1.63	0.00	0.31	0.00
Saudi Arabia	-4.12	0.32	-2.77	0.09	0.45	0.00	0.25	0.00
Serbia	-0.75	0.00	-0.64	0.59	1.27	0.00	0.50	0.00
Singapore	-2.24	0.00	-0.43	0.56	0.95	0.00	0.11	0.00
Slovak Republic	-1.13	0.00	-0.94	0.14	0.23	0.09	0.10	0.12
Slovenia	-0.96	0.00	1.48	0.12	0.87	0.00	0.36	0.00
South Africa	-1.20	0.00	-0.15	0.85	0.84	0.00	0.17	0.00
Spain	-1.06	0.00	0.28	0.68	0.88	0.00	0.03	0.39
Sri Lanka	-1.85	0.00	0.01	0.61	0.13	0.16	0.05	0.27
Sweden	-0.96	0.00	-0.62	0.33	0.96	0.00	0.08	0.02
Switzerland	-0.69	0.00	-0.77	0.26	0.70	0.00	0.03	0.23
Taiwan	-2.47	0.00	-0.58	0.33	0.84	0.00	0.02	0.69
Thailand	-1.36	0.00	-0.57	0.35	0.93	0.00	0.08	0.13
Tunisia	-0.82	0.00	0.02	0.80	0.15	0.02	0.04	0.18
Turkey	-1.46	0.00	-0.47	0.30	1.27	0.00	0.20	0.04
Ukraine	-1.04	0.00	0.01	0.91	1.07	0.00	0.32	0.00
United Kingdom	-0.88	0.00	0.64	0.27	0.83	0.00	0.09	0.00
United States	NA	NA	-0.74	0.34	1.00	0.00	0.03	0.23
Venezuela	-0.93	0.00	-0.71	0.12	0.36	0.01	0.12	0.08
Viet Nam	-0.40	0.48	-2.71	0.13	1.11	0.00	0.16	0.33

Table III: In-sample predictability results

This table reports results on excess return predictability for 77 countries using the bias-adjusted FGLS estimator proposed by Westerlund and Narayan (2015). The slope coefficient associated with the predictor variable and its p-value are reported in Panel A. The null hypothesis is that the slope coefficient is zero, that is, there is no predictability. In Panel B, we present a summary of the results: specifically, we report the number and proportion of countries that have statistically significant or statistically insignificant slope coefficients with positive and negative signs.

Panel A: Regression								
Countries	Exchange rate returns		Inflation rate		U.S. excess returns		Crude oil returns	
	Coeff.	p-value	Coeff.	p-value	Coeff.	p-value	Coeff.	p-value
Argentina	-0.20	0.01	-0.06	0.42	0.98	0.00	0.19	0.04
Australia	-1.49	0.00	-0.04	0.97	1.01	0.00	0.14	0.06
Austria	-1.11	0.00	1.46	0.19	0.85	0.00	0.13	0.24
Belgium	-1.11	0.00	-0.13	0.45	1.02	0.00	0.03	0.76
Brazil	-0.21	0.06	-0.04	0.23	1.47	0.00	-0.11	0.54
Bulgaria	-2.10	0.01	-0.45	0.69	1.40	0.01	0.49	0.01
Canada	-2.26	0.00	0.17	0.91	1.11	0.00	0.13	0.06
Chile	-1.38	0.00	-0.68	0.29	0.77	0.00	0.07	0.39
China	-1.06	0.00	0.87	0.34	0.46	0.02	0.10	0.40
Colombia	-1.71	0.00	0.05	0.90	0.64	0.00	0.03	0.72
Croatia	-0.74	0.00	-0.47	0.14	1.27	0.00	0.32	0.02
Cyprus	-3.15	0.00	0.42	0.87	1.92	0.00	0.55	0.00
Czech Republic	-1.62	0.00	-1.01	0.43	0.99	0.00	0.33	0.00
Denmark	-0.91	0.00	-2.00	0.01	0.73	0.00	0.10	0.17
Egypt	-1.93	0.01	0.98	0.34	0.95	0.00	0.31	0.01
Finland	-0.66	0.02	0.30	0.76	0.85	0.00	0.03	0.72
France	-0.78	0.00	1.41	0.46	0.98	0.00	0.06	0.45
Germany	-0.81	0.00	-0.90	0.53	0.93	0.00	-0.01	0.93
Ghana	-0.88	0.05	0.23	0.87	0.64	0.06	0.05	0.51
Greece	-1.15	0.00	-0.41	0.51	1.16	0.00	0.04	0.76
Hong Kong	-3.99	0.00	0.18	0.81	1.02	0.00	0.08	0.22
Hungary	-1.44	0.00	0.94	0.39	1.60	0.00	0.31	0.02
Iceland	-2.40	0.00	-7.68	0.10	1.48	0.02	0.50	0.16
India	-1.46	0.01	0.04	0.43	0.63	0.00	0.13	0.06
Indonesia	-1.11	0.00	-0.68	0.06	1.12	0.00	0.13	0.30
Ireland	-0.79	0.00	-0.30	0.69	1.14	0.00	0.00	0.96
Israel	-0.46	0.02	-0.22	0.27	0.78	0.00	0.03	0.70
Italy	-0.98	0.00	-1.21	0.32	0.87	0.00	-0.05	0.63
Jamaica	-1.02	0.00	-0.69	0.12	0.27	0.02	0.08	0.16
Japan	-0.86	0.00	-0.08	0.94	0.72	0.00	0.04	0.55
Jordan	-1.18	0.00	0.09	0.71	0.25	0.11	0.00	0.95
Kazakhstan	-0.37	0.09	0.79	0.44	1.70	0.00	0.61	0.00
Kenya	-1.09	0.00	-0.16	0.67	0.37	0.02	0.01	0.88
Korea South	-1.48	0.00	-0.45	0.74	1.05	0.00	0.06	0.47
Kuwait	-3.26	0.06	-0.24	0.80	0.41	0.09	0.19	0.09
Latvia	-0.66	0.37	-0.28	0.28	0.88	0.00	0.27	0.01
Lithuania	-1.81	0.00	-0.93	0.44	1.12	0.00	0.31	0.06
Luxembourg	-0.94	0.00	-1.75	0.12	0.82	0.00	0.06	0.57
Macedonia	-2.52	0.00	1.61	0.16	1.27	0.01	0.63	0.00
Malaysia	-2.09	0.00	0.88	0.59	0.85	0.00	0.11	0.15
Malta	-0.95	0.00	-0.78	0.53	0.54	0.00	0.17	0.00
Mauritius	-1.42	0.00	0.09	0.38	0.45	0.05	0.16	0.04
Mexico	-1.07	0.00	0.19	0.70	1.78	0.00	0.15	0.09
Morocco	-1.09	0.00	0.27	0.63	0.44	0.00	0.14	0.07
Namibia	-1.50	0.00	3.39	0.38	1.23	0.00	0.26	0.06
Netherlands	-0.73	0.00	-1.49	0.04	1.01	0.00	0.06	0.38
New Zealand	-1.22	0.00	0.34	0.78	0.94	0.00	0.05	0.55

Nigeria	-2.09	0.00	0.44	0.28	0.69	0.01	0.35	0.01
Norway	-1.17	0.00	-0.88	0.50	1.17	0.00	0.26	0.00
Oman	-0.94	0.29	0.49	0.78	0.47	0.01	0.30	0.00
Pakistan	-1.48	0.00	-1.30	0.16	0.20	0.07	0.07	0.46
Peru	-0.01	0.93	0.20	0.02	0.63	0.03	0.29	0.11
Philippines	-1.64	0.00	-1.31	0.04	0.88	0.00	0.00	0.97
Poland	-1.63	0.00	0.57	0.61	1.37	0.00	0.26	0.05
Portugal	-1.30	0.00	0.09	0.89	0.90	0.00	0.03	0.72
Qatar	-16.05	0.57	-1.57	0.53	1.10	0.00	0.44	0.00
Romania	-2.09	0.00	-0.75	0.24	1.26	0.00	0.45	0.00
Russia	-1.13	0.00	-0.11	0.62	2.04	0.00	0.50	0.00
Saudi Arabia	-20.54	0.00	-3.52	0.15	0.62	0.01	0.34	0.00
Serbia	-2.15	0.00	0.94	0.38	1.80	0.00	0.61	0.00
Singapore	-2.27	0.00	-2.71	0.03	1.03	0.00	0.12	0.13
Slovak Republic	-1.10	0.00	-1.04	0.26	0.24	0.24	0.13	0.13
Slovenia	-1.96	0.00	1.68	0.18	1.09	0.00	0.45	0.00
South Africa	-1.20	0.00	0.02	0.98	0.95	0.00	0.18	0.06
Spain	-1.06	0.00	-0.22	0.83	0.94	0.00	-0.04	0.69
Sri Lanka	-1.85	0.00	0.02	0.00	0.34	0.05	0.02	0.71
Sweden	-0.84	0.00	-0.83	0.33	1.11	0.00	-0.01	0.89
Switzerland	-0.68	0.00	-0.91	0.37	0.78	0.00	-0.01	0.92
Taiwan	-2.92	0.00	-1.42	0.32	0.97	0.00	0.00	0.98
Thailand	-1.37	0.00	-1.55	0.03	1.05	0.00	0.02	0.88
Tunisia	-0.89	0.00	-0.10	0.53	0.17	0.22	0.08	0.22
Turkey	-1.37	0.00	-0.32	0.33	1.75	0.00	0.13	0.30
Ukraine	-1.56	0.00	0.03	0.08	1.86	0.00	0.53	0.00
United Kingdom	-0.88	0.00	0.13	0.86	0.90	0.00	0.03	0.68
United States	1.00	0.00	-1.00	0.49	1.00	0.00	-0.01	0.83
Venezuela	-0.98	0.00	-0.26	0.73	0.46	0.02	0.14	0.11
Viet Nam	-3.58	0.06	-1.09	0.55	1.30	0.00	0.07	0.71
Panel B: Summary								
	Exchange rate returns		Inflation rate		U.S. excess returns		Crude oil returns	
	Number	%	Number	%	Number	%	Number	%
(-) significant	72	95%	7	9%	0	0%	0	0%
(+) significant	0	0%	3	4%	74	96%	32	42%
(-) insignificant	4	5%	38	49%	0	0%	7	9%
(+) insignificant	0	0%	29	38%	3	4%	38	49%
Panel C: Summary								
	Exchange rate returns		Inflation rate		U.S. excess returns		Crude oil returns	
	Number	%	Number	%	Number	%	Number	%
(-) significant								
Full High	38	97%	3	8%	0	0%	0	0%
Full Low	34	89%	4	11%	0	0%	0	0%
Developed High	14	93%	0	0%	0	0%	0	0%
Developed Low	14	0%	3	20%	0	0%	0	0%
Emerging High	24	100%	3	13%	0	0%	0	0%
Emerging Low	20	87%	1	4%	0	0%	0	0%
(+) significant								
Full High	0	0%	0	0%	39	100%	12	31%
Full Low	0	0%	3	8%	35	92%	20	53%
Developed High	0	0%	0	0%	15	100%	2	13%
Developed Low	0	0%	0	0%	14	93%	4	27%
Emerging High	0	0%	1	4%	24	100%	14	58%
Emerging Low	0	0%	2	9%	21	91%	12	52%

Table IV: Out-of-sample results based on the unconstrained approach

This table reports results from the out-of-sample forecasting evaluations of the importance of each of the four predictors in forecasting excess returns vis-à-vis the constant returns model. We use a 50% in-sample period to generate recursive forecasts of excess returns for the remaining 50% of the sample. In panel A, we report the out-of-sample R-squared (OOR), which examines the difference in the mean squared errors from the predictive model and the constant returns model. The p-value of Clark and West MSFE-adjusted test statistic, which examines the null hypothesis that the $OOR = 0$ against the alternative that the $OOR > 0$, is also reported. Panel B contains a summary of the results; specifically, we report the number and proportion of countries that have positive OOR and positive and statistically significant OOR.

Panel A: Regression								
Countries	Exchange rate returns		Inflation rate		U.S. excess returns		Crude oil returns	
	OOR	p-value	OOR	p-value	OOR	p-value	OOR	p-value
Argentina	-1.56	0.90	-0.65	0.64	1.67	0.05	-2.73	0.85
Australia	-0.78	0.75	-0.38	0.82	-0.28	0.37	-1.93	0.86
Austria	-0.04	0.41	-0.22	0.75	2.50	0.06	-1.12	0.91
Belgium	0.55	0.22	-20.23	0.83	0.96	0.19	-1.66	0.63
Brazil	-0.37	0.85	-0.03	0.65	-0.45	0.52	-12.84	0.56
Bulgaria	-2.40	0.51	-0.38	0.64	3.14	0.11	2.04	0.15
Canada	-1.06	0.32	-0.34	0.87	2.19	0.05	-1.26	0.88
Chile	-1.24	0.26	0.31	0.21	0.94	0.12	-0.57	0.84
China	-0.02	0.61	-1.16	0.68	-1.35	0.56	-1.03	0.66
Colombia	6.60	0.00	-2.83	0.74	1.23	0.06	-1.25	0.76
Croatia	0.80	0.14	-3.79	0.88	0.09	0.32	-1.61	0.81
Cyprus	-4.23	0.54	-1.48	0.80	-12.17	0.90	-1.26	0.50
Czech Republic	1.51	0.12	-0.67	0.72	-0.61	0.54	3.71	0.01
Denmark	-0.27	0.63	-0.47	0.46	-0.38	0.53	-0.98	0.69
Egypt	2.15	0.04	-1.74	0.95	0.57	0.24	-1.98	0.84
Finland	-0.27	0.44	-0.25	0.63	-0.34	0.72	-1.02	0.39
France	-0.69	0.86	-1.34	0.59	-0.53	0.67	-0.59	0.82
Germany	-0.74	0.93	0.14	0.24	0.09	0.31	-2.74	0.63
Ghana	5.02	0.07	-3.90	0.66	3.47	0.13	-1.57	0.55
Greece	-0.75	0.73	-1.97	0.85	1.33	0.05	-3.29	0.79
Hong Kong	0.16	0.34	-2.36	0.80	-0.60	0.55	-1.13	0.96
Hungary	-1.17	0.66	-0.04	0.45	1.77	0.08	1.48	0.08
Iceland	5.92	0.09	3.35	0.01	4.61	0.01	0.24	0.18
India	-0.06	0.37	-1.19	0.92	0.75	0.16	0.08	0.33
Indonesia	-0.19	0.43	-0.61	0.06	3.46	0.02	-0.78	0.86
Ireland	-0.78	0.86	-0.14	0.61	2.40	0.05	-2.35	0.67
Israel	0.51	0.17	-0.05	0.39	3.52	0.02	-1.45	0.54
Italy	-0.40	0.87	-0.43	0.46	0.43	0.22	-6.26	0.28
Jamaica	0.68	0.06	-4.05	0.97	1.91	0.02	-0.45	0.59
Japan	-1.65	0.72	-0.22	0.90	0.79	0.13	-1.62	0.91
Jordan	-0.34	0.97	-1.01	0.94	0.74	0.13	-3.11	0.69
Kazakhstan	-5.78	0.80	-0.26	0.77	-6.36	0.32	-3.17	0.06
Kenya	1.80	0.01	-0.12	0.48	-0.86	0.89	-0.52	0.55
Korea South	-0.42	0.16	-1.02	0.96	1.39	0.09	-0.89	0.48
Kuwait	-2.92	0.69	-0.70	0.91	-0.15	0.39	3.51	0.10
Latvia	-5.70	0.75	-10.48	0.71	2.13	0.09	1.38	0.17
Lithuania	-0.43	0.22	-3.61	0.45	3.09	0.10	-0.54	0.42
Luxembourg	-0.97	0.80	-1.79	0.37	0.64	0.18	-2.00	0.67
Macedonia	-21.95	0.56	-2.45	0.83	-20.13	0.56	-6.10	0.15
Malaysia	-11.37	0.72	-0.53	0.91	-0.76	0.71	-0.98	0.84
Malta	-1.70	0.74	-6.14	0.83	-0.13	0.17	0.84	0.18
Mauritius	3.28	0.03	-4.24	0.36	0.87	0.23	1.48	0.03
Mexico	-1.08	0.66	-1.78	0.47	-22.39	0.28	-0.09	0.49
Morocco	-4.97	0.64	-1.32	0.60	-2.12	0.32	-5.61	0.89
Namibia	-5.91	0.55	7.21	0.04	1.67	0.19	-2.14	0.97

Netherlands	-0.53	0.90	-1.08	0.74	0.78	0.16	-1.35	0.56
New Zealand	-0.68	0.97	-0.38	0.81	1.05	0.05	-4.62	0.91
Nigeria	1.84	0.14	-0.52	0.78	3.23	0.07	5.72	0.07
Norway	-0.78	0.79	0.08	0.34	2.05	0.05	-0.25	0.74
Oman	-0.08	0.79	-1.37	0.63	5.90	0.01	11.17	0.00
Pakistan	-0.63	0.77	0.53	0.15	-0.73	0.82	-0.42	0.92
Peru	-5.21	0.70	-4.67	0.58	-0.89	0.90	0.74	0.08
Philippines	-0.03	0.47	-0.40	0.39	1.88	0.02	-0.60	0.51
Poland	0.68	0.13	-1.01	0.88	-2.70	0.95	0.51	0.22
Portugal	0.52	0.12	0.07	0.31	2.41	0.03	-1.10	0.68
Qatar	-6.12	0.89	-3.03	0.35	-12.72	0.51	-2.71	0.04
Romania	-0.44	0.18	-3.69	0.76	0.19	0.22	3.43	0.06
Russia	1.87	0.08	1.33	0.10	2.15	0.10	5.73	0.02
Saudi Arabia	2.14	0.19	-4.18	0.80	1.54	0.15	3.20	0.08
Serbia	-8.75	0.41	0.80	0.12	-14.33	0.32	-2.87	0.21
Singapore	-1.07	0.83	3.32	0.00	0.69	0.16	-0.46	0.70
Slovak Republic	-1.16	0.98	-0.47	0.58	-1.00	0.71	-0.91	0.66
Slovenia	-13.84	0.77	-8.75	0.70	-9.53	0.58	0.11	0.18
South Africa	-0.46	0.84	-3.36	0.87	0.06	0.25	0.23	0.21
Spain	-0.23	0.51	-0.48	0.69	-0.46	0.31	-4.17	0.61
Sri Lanka	-0.78	0.71	-17.17	0.22	2.18	0.05	-0.85	0.86
Sweden	-1.00	0.86	-0.22	0.73	0.07	0.15	-2.66	0.42
Switzerland	-0.95	0.89	-1.89	0.94	1.32	0.11	-5.51	0.88
Taiwan	-1.17	0.34	0.54	0.17	-1.03	0.37	-0.84	0.76
Thailand	-5.96	0.93	-0.08	0.11	0.63	0.13	-1.75	0.72
Tunisia	-0.82	0.44	-0.21	0.40	-1.34	0.51	-0.08	0.33
Turkey	-1.65	0.45	-0.24	0.58	-0.29	0.12	-0.41	0.56
Ukraine	0.43	0.18	-8.68	0.15	8.59	0.01	2.92	0.03
United Kingdom	0.07	0.36	-0.60	0.78	1.71	0.08	-3.90	0.68
United States	NA	NA	-4.28	0.70	0.17	0.32	-1.56	0.40
Venezuela	-0.32	0.70	-0.59	0.84	-0.06	0.48	-1.41	0.83
Viet Nam	-5.47	0.90	-4.19	0.97	-4.34	0.59	-4.88	0.77
Panel B: Summary of the results								
	Exchange rate returns		Inflation rate		U.S. excess returns		Crude oil returns	
	Number	%	Number	%	Number	%	Number	%
(+) OOR	19	25%	11	14%	47	61%	19	25%
(+)significant OOR	8	11%	4	5%	23	30%	13	17%

Table V: Out-of-sample results based on the constrained approach

This table reports results from the out-of-sample forecasting evaluations of the importance of each of the four predictors in forecasting excess returns vis-à-vis the constant returns model. We use a 50% in-sample period to generate recursive forecasts of excess returns for the remaining 50% of the sample. The constrained approach is the application of the Campbell and Thompson (2008) sign restrictions. In panel A, we report the out-of-sample R-squared (OOR), which examines the difference in the mean squared errors from the competition model and the constant returns model. The p-value of Clark and West MSFE-adjusted test statistic, which examines the null hypothesis that the $OOR = 0$ against the alternative that the $OOR > 0$, is also reported. Panel B contains a summary of the results; specifically, we report the number and proportion of countries that have positive OOR and positive and statistically significant OOR.

Panel A: Regression								
Countries	Exchange rate returns		Inflation rate		U.S. excess returns		Crude oil returns	
	OOR	p-value	OOR	p-value	OOR	p-value	OOR	p-value
Argentina	-0.62	0.73	0.33	0.37	1.41	0.08	-0.54	0.71
Australia	-0.08	0.53	0.29	0.38	0.71	0.24	-0.48	0.68
Austria	-0.12	0.55	-0.16	0.56	0.96	0.17	-0.58	0.72
Belgium	-0.31	0.62	-0.04	0.52	0.89	0.19	-1.41	0.92
Brazil	-0.34	0.63	-0.03	0.51	0.01	0.50	-5.87	1.00
Bulgaria	-4.36	1.00	-0.38	0.65	1.00	0.16	-1.09	0.86
Canada	0.31	0.38	0.12	0.45	1.54	0.06	-0.02	0.51
Chile	0.94	0.17	0.31	0.38	1.08	0.14	-0.54	0.71
China	-0.02	0.51	-1.06	0.85	-0.39	0.65	-0.32	0.62
Colombia	3.58	0.00	-0.40	0.66	1.12	0.13	-0.10	0.54
Croatia	0.84	0.20	-0.36	0.64	-0.17	0.57	-1.65	0.95
Cyprus	-6.17	1.00	-3.16	1.00	-12.52	1.00	-4.30	1.00
Czech Republic	0.84	0.20	0.26	0.40	0.22	0.41	1.50	0.07
Denmark	-0.34	0.63	-0.22	0.59	-0.33	0.63	-0.69	0.75
Egypt	0.82	0.21	-1.72	0.96	0.65	0.26	-2.06	0.98
Finland	-0.60	0.73	-0.14	0.56	-0.28	0.61	-0.67	0.75
France	-0.47	0.68	-0.67	0.75	0.10	0.46	-0.39	0.65
Germany	-0.64	0.74	-0.22	0.59	0.28	0.39	-1.42	0.92
Ghana	4.38	0.00	-1.11	0.87	2.33	0.01	0.56	0.29
Greece	-0.31	0.62	-1.45	0.93	0.91	0.18	-1.41	0.92
Hong Kong	0.15	0.44	-2.45	0.99	0.12	0.45	-0.44	0.67
Hungary	-0.30	0.62	-0.04	0.52	1.71	0.04	0.70	0.24
Iceland	-6.82	1.00	0.78	0.22	1.13	0.13	-0.30	0.62
India	-0.04	0.52	-0.24	0.60	0.68	0.25	0.14	0.45
Indonesia	0.83	0.20	0.11	0.46	2.72	0.00	1.36	0.09
Ireland	-0.72	0.76	-0.14	0.55	1.53	0.06	-2.10	0.98
Israel	0.56	0.29	-0.05	0.52	2.20	0.01	-0.95	0.83
Italy	-0.12	0.55	-0.62	0.73	0.41	0.34	-2.96	1.00
Jamaica	0.59	0.28	-3.98	1.00	0.61	0.27	-0.48	0.68
Japan	-0.95	0.83	0.15	0.44	0.31	0.38	-0.18	0.57
Jordan	1.25	0.11	0.71	0.24	1.18	0.12	-0.07	0.53
Kazakhstan	-11.46	1.00	-6.12	1.00	-12.72	1.00	-9.64	1.00
Kenya	1.03	0.15	0.48	0.31	0.40	0.35	-0.05	0.52
Korea South	0.05	0.48	0.14	0.44	1.33	0.09	1.00	0.16
Kuwait	-2.44	0.99	-0.71	0.76	0.52	0.30	0.67	0.25
Latvia	-5.71	1.00	-55.12	1.00	0.00	0.50	0.09	0.47
Lithuania	-1.19	0.88	-4.07	1.00	0.96	0.17	-1.02	0.85
Luxembourg	-0.87	0.81	-1.61	0.95	0.58	0.28	-1.09	0.86
Macedonia	-17.89	1.00	-1.18	0.88	-21.06	1.00	-9.67	1.00
Malaysia	-4.55	1.00	0.84	0.20	1.12	0.13	0.95	0.17
Malta	-1.67	0.95	-6.18	1.00	-1.73	0.96	0.31	0.38
Mauritius	2.92	0.00	1.31	0.10	1.47	0.07	1.12	0.13
Mexico	-0.18	0.57	-0.07	0.53	-5.16	1.00	0.01	0.50
Morocco	-6.20	1.00	-1.27	0.90	-2.79	1.00	-5.88	1.00

Namibia	-5.58	1.00	2.84	0.00	2.30	0.01	1.78	0.04
Netherlands	-0.53	0.70	-0.52	0.70	0.68	0.25	-0.98	0.84
New Zealand	0.33	0.37	0.37	0.36	1.26	0.10	-1.20	0.88
Nigeria	1.10	0.14	-0.52	0.70	1.74	0.04	0.62	0.27
Norway	-0.48	0.68	0.02	0.49	1.30	0.10	-0.18	0.57
Oman	-0.08	0.53	-1.37	0.91	2.03	0.02	1.61	0.05
Pakistan	-0.15	0.56	0.52	0.30	0.11	0.46	0.13	0.45
Peru	-0.84	0.80	-0.44	0.67	-0.63	0.74	0.88	0.19
Philippines	0.66	0.26	0.42	0.34	1.01	0.16	0.79	0.22
Poland	0.71	0.24	-0.78	0.78	-2.48	0.99	0.46	0.32
Portugal	-0.29	0.62	0.49	0.31	0.94	0.17	-0.64	0.74
Qatar	-6.12	1.00	-2.71	1.00	-10.10	1.00	-1.35	0.91
Romania	-3.12	1.00	-3.73	1.00	1.42	0.08	0.04	0.49
Russia	1.58	0.06	1.26	0.10	1.60	0.06	1.75	0.04
Saudi Arabia	1.10	0.14	-1.66	0.95	0.57	0.29	1.14	0.13
Serbia	6.08	0.00	5.85	0.00	-8.38	1.00	2.04	0.02
Singapore	0.33	0.37	1.77	0.04	1.09	0.14	0.42	0.34
Slovak Republic	-1.00	0.84	0.27	0.39	-0.48	0.68	-0.62	0.73
Slovenia	-2.47	0.99	1.78	0.04	-6.39	1.00	0.69	0.25
South Africa	0.61	0.27	-1.25	0.89	1.07	0.14	0.66	0.25
Spain	-0.11	0.54	-0.42	0.66	0.37	0.36	-1.59	0.94
Sri Lanka	0.29	0.39	-0.03	0.51	1.92	0.03	-0.38	0.65
Sweden	-0.97	0.83	-0.22	0.59	0.48	0.31	-2.03	0.98
Switzerland	-0.85	0.80	-1.85	0.97	0.61	0.27	-3.57	1.00
Taiwan	-0.55	0.71	0.68	0.25	-0.24	0.59	-0.73	0.77
Thailand	-0.06	0.52	-0.06	0.52	1.21	0.11	0.59	0.28
Tunisia	-1.13	0.87	0.55	0.29	-0.95	0.83	-0.49	0.69
Turkey	-1.44	0.92	0.24	0.40	2.25	0.01	0.05	0.48
Ukraine	0.50	0.31	-1.67	0.95	3.63	0.00	-0.97	0.83
United Kingdom	0.14	0.44	-0.60	0.73	1.21	0.11	-2.53	0.99
United States	NA	NA	-4.39	1.00	0.31	0.38	-0.99	0.84
Venezuela	0.25	0.40	-0.08	0.53	0.46	0.32	0.00	0.50
Vietnam	-3.46	1.00	-3.96	1.00	0.03	0.49	-3.20	1.00

Panel B: Summary of the results

	Exchange rate returns		Inflation rate		U.S. excess returns		Crude oil returns	
	Number	%	Number	%	Number	%	Number	%
(+) OOR	28	37%	27	35%	58	75%	28	36%
(+)significant OOR	13	17%	9	12%	28	36%	8	10%

Table VI: Mean-variance portfolio profits

This table reports annualized profits and their *t*-statistics for a mean-variance investor based on forecasting models using exchange rate returns (Panel A) and U.S. stock market excess returns (Panel B) as predictors. Profits are estimated for each of the nine country portfolios. The portfolios comprise equal-weighted countries that have either significant in-sample or out-of-sample predictable returns. We use a 50% in-sample period to generate recursive forecasts of excess returns for the remaining 50% of the sample. Profits are computed based on first estimating the portfolio weight, which is an increasing function of return forecasts and a decreasing function of the return variance and the risk aversion factor $\gamma = 6$ (representing an investor who entertains a medium level of risk). The variance is computed using a 60-month rolling window of stock returns. The portfolio weight ω is restricted to be between 0 and 1, implying that there is no short-selling and borrowing, or restricted to be between -0.5 and 1.5, which allows for 50% short-selling and borrowing. Our portfolio is a two-asset portfolio, where one is a risky asset and the other is a risk-free asset. The portfolio weight is used to decide the proportion of a dollar to be invested in the risky asset (which is the stock market) and the risk-free asset (which is the US three-month Treasury Bill rate). Finally, *, **, and *** denote statistical significance at 10%, 5%, and 1% level, respectively.

Panel A: Exchange rate returns predictor				
Portfolios	ω(0,1)		ω(-0.5,1.5)	
	Profits	*t*-statistics	Profits	*t*-statistics
Full (All-77)	3.86	1.53	4.15	1.41
Full High	3.52	1.19	3.12	0.88
Full Low	4.68**	2.23	6.16**	2.38
Developed	2.58	0.88	2.06	0.58
Developed High	2.98	1.01	2.36	0.64
Developed Low	2.28	0.74	1.85	0.50
Emerging	4.73**	2.04	5.64**	2.05
Emerging High	4.42	1.49	4.95	1.36
Emerging Low	5.04***	2.82	6.23***	2.77
Panel B: U.S. excess returns predictor				
Portfolios	ω(0,1)		ω(-0.5,1.5)	
	Profits	*t*-statistics	Profits	*t*-statistics
Full (All-77)	5.66**	2.23	8.02**	2.32
Full High	5.57**	1.97	7.40*	1.93
Full Low	5.78**	2.53	8.90***	2.79
Developed	5.03*	1.78	7.43*	1.89
Developed High	4.53*	1.65	6.05	1.61
Developed Low	5.84*	1.92	9.33**	2.15
Emerging	5.92**	2.43	8.10**	2.45
Emerging High	6.41**	2.20	8.84**	2.15
Emerging Low	5.05**	2.26	6.63**	2.19

Table VII: Out-of-sample robustness tests

This table reports the results of robustness tests from the out-of-sample forecasting evaluations of the importance of each of the four predictors in forecasting excess returns vis-à-vis the constant returns model. We use 30% and 70% in-sample periods to generate recursive forecasts of excess returns for the remaining 70% and 30% of the sample, respectively. The constrained approach indicates the application of Campbell and Thompson (2008) sign restriction in generating return forecasts. We report the number and proportion of countries that have positive OOR and positive and statistically significant OOR.

Panel A: In-sample 30% using non-constrained approach								
	Exchange rate returns		Inflation rate		U.S. excess returns		Crude oil returns	
	Number	%	Number	%	Number	%	Number	%
(+) OOR	7	9%	9	12%	23	30%	7	9%
(+)significant OOR	3	4%	3	4%	14	18%	4	5%
Panel B: In-sample 30% using constrained approach								
	Exchange rate returns		Inflation		U.S. excess returns		Crude oil returns	
	Number	%	Number	%	Number	%	Number	%
(+) OOR	24	32%	28	36%	39	51%	24	32%
(+)significant OOR	13	17%	14	18%	27	35%	10	13%
Panel C: In-sample 70% using non-constrained approach								
	Exchange rate returns		Inflation rate		U.S. excess returns		Crude oil returns	
	Number	%	Number	%	Number	%	Number	%
(+) OOR	21	28%	12	16%	44	57%	21	28%
(+)significant OOR	8	11%	3	4%	19	25%	12	16%
Panel D: In-sample 70% using constrained approach								
	Exchange rate returns		Inflation rate		U.S. excess returns		Crude oil returns	
	Number	%	Number	%	Number	%	Number	%
(+) OOR	26	34%	26	34%	55	71%	21	28%
(+)significant OOR	9	12%	10	13%	28	36%	9	12%

Table VIII: Robustness tests using real variables

This table reports the results using real variables instead of nominal variables. Panel A reports results on in-sample predictability of country excess returns based on the bias-adjusted FGLS estimator. We report the number and proportion of countries that have statistically significant or statistically insignificant slope coefficients with positive and negative signs. Panel B reports results from the out-of-sample forecasting evaluations using a non-constrained model while the results from the constrained model are reported in Panel C. We use a 50% in-sample period to generate recursive forecasts of excess returns for the remaining 50% of the sample. The constrained approach indicates the application of Campbell and Thompson (2008) sign restriction to generate return forecasts. We report the number and proportion of countries that have positive OOR and positive and statistically significant OOR.

Panel A: In-sample results								
	Exchange rate return		Inflation rate		U.S. excess returns		Crude oil returns	
	Number	%	Number	%	Number	%	Number	%
(-) significant	60	79%	36	47%	0	0%	0	0%
(+) significant	4	5%	2	3%	72	94%	42	55%
(-) insignificant	4	5%	34	44%	0	0%	6	8%
(+) insignificant	8	11%	5	6%	5	6%	29	38%
Panel B: Out-of-sample results using non-constrained model								
	Exchange rate return		Inflation rate		U.S. excess returns		Crude oil returns	
	Number	%	Number	%	Number	%	Number	%
(+) OOR	15	20%	18	23%	48	62%	18	24%
(+)significant OOR	8	11%	13	17%	27	35%	11	14%
Panel C: Out-of-sample results using constrained model								
	Exchange rate return		Inflation rate		U.S. excess returns		Crude oil returns	
	Number	%	Number	%	Number	%	Number	%
(+) OOR	32	42%	37	48%	57	74%	35	46%
(+)significant OOR	17	22%	18	23%	29	38%	18	24%

Table IX: Mean-variance profits of portfolios (robustness tests)

This table reports annualized profits and their t-statistics (in parentheses) for a mean-variance investor based on forecasting models using exchange rate returns (Panel A) and U.S. stock market returns (Panel B) as predictors. There are a total of nine country-based equal-weighted portfolios. We use 30%, 50%, and 70% in-sample periods to generate recursive forecasts of excess returns for the remaining 70%, 50%, and 30% of the sample, respectively. Profits are computed based on first estimating the portfolio weight, which is an increasing function of return forecasts and a decreasing function of the return variance and the risk aversion factor $\gamma = 3, 6,$ or 12. The variance is computed using a 60-month rolling window of stock returns. The portfolio weight ω is restricted to be between 0 and 1, implying that there is no short-selling and borrowing, or restricted to be between -0.5 and 1.5, which allows for 50% short-selling and borrowing. Our portfolio is a two-asset portfolio, where one is a risky asset and the other is a risk-free asset. The portfolio weight is used to decide the proportion of a dollar to be invested in the risky asset (which is the stock market) and the risk-free asset (which is the US three-month Treasury Bill rate). The last column reports the average profit for each portfolio.

Countries	In-sample 30%						In-sample 50%						In-sample 70%						Average
	ω(0,1)			ω(-0.5,1.5)			ω(0,1)			ω(-0.5,1.5)			ω(0,1)			ω(-0.5,1.5)			
	γ(3)	γ(6)	γ(12	γ(3)	γ(6)	γ(12	γ(3)	γ(6)	γ(12	γ(3)	γ(6)	γ(12	γ(3)	γ(6)	γ(12	γ(3)	γ(6)	γ(12	
Argentina	6.9	7.1	7.2	8.8	10.6	9.6	8.4	8.4	8.5	14.1	15.3	13.4	7.3	7.1	8.7	9.3	11.7	11.4	9.7
Australia	1.8	2.4	2.7	0.4	1.4	1.9	2.9	3.8	3.9	3.1	4.4	4.1	2.4	4.0	4.3	3.7	5.1	4.8	3.2
Austria	5.5	5.1	4.6	8.4	7.5	7.2	8.2	7.8	6.8	12.8	11.7	10.9	3.7	3.1	3.3	5.8	5.5	7.8	7.0
Belgium	0.8	0.9	1.2	0.7	1.2	1.9	2.7	2.2	2.5	3.5	3.8	3.8	-5.7	-4.7	-1.7	-7.0	-3.6	0.5	0.2
Brazil	8.2	5.8	2.4	8.1	3.6	2.6	7.3	5.7	2.5	8.7	4.6	3.1	7.2	5.0	2.1	9.9	5.9	4.7	5.4
Bulgaria	3.9	4.3	4.4	8.7	9.7	7.8	-8.9	-8.5	-8.3	-8.6	-7.2	-9.9	7.1	8.1	8.3	10.1	12.6	8.5	2.3
Canada	5.9	5.4	5.6	7.9	8.0	7.3	6.0	5.4	5.8	8.9	9.3	8.4	6.0	5.2	5.6	9.0	9.0	8.5	7.1
Chile	3.2	3.4	4.6	3.8	5.2	5.3	8.6	8.6	9.1	12.5	13.1	11.7	3.6	3.5	4.8	4.1	5.5	6.4	6.5
China	6.4	5.9	5.1	7.9	7.2	6.3	9.2	8.9	8.1	13.3	13.0	11.8	-4.7	-5.0	-4.9	-7.5	-6.2	-4.8	3.9
Colombia	9.8	7.8	6.3	9.8	7.7	5.9	9.8	8.1	6.5	12.5	11.2	9.2	8.9	5.9	5.3	9.1	7.5	6.6	8.2
Croatia	1.0	1.0	0.9	-0.5	-0.5	-0.6	2.1	2.3	1.8	6.2	5.4	3.6	-4.5	-5.2	-3.8	-4.5	-4.5	-4.1	-0.2
Cyprus	-26.9	-26.1	-24.2	-24.4	-22.9	-19.3	-34.7	-33.4	-30.3	-39.7	-37.6	-30.9	-17.1	-15.1	-9.9	-16.0	-12.5	-4.7	-23.6
Czech Republic	-1.0	-0.1	1.1	-5.2	-3.5	-2.6	-2.0	-0.9	0.6	-3.9	-1.7	-0.6	-3.1	-0.8	0.6	-1.8	0.8	-0.2	-1.4
Denmark	6.2	5.9	4.9	7.4	6.5	4.8	5.8	5.6	4.2	7.3	6.1	3.5	6.7	6.8	5.3	9.3	8.2	5.8	6.1
Egypt	10.1	10.0	8.1	9.5	8.4	3.3	3.3	5.0	5.7	5.5	8.1	5.7	4.5	5.0	3.0	7.4	5.8	0.4	6.0
Finland	6.2	3.5	1.3	5.4	0.8	1.4	4.8	3.3	1.7	4.8	1.3	2.3	0.8	0.2	-0.5	-1.1	-2.5	-0.8	1.8
France	0.4	0.3	0.9	-2.6	-2.0	-0.7	-2.7	-1.9	0.0	-6.1	-3.4	-1.2	-5.3	-3.1	-0.6	-7.6	-3.7	-1.6	-2.3

Germany	3.3	2.1	2.3	2.0	1.3	1.7	3.0	1.8	2.3	2.3	1.9	2.5	5.0	2.7	2.6	3.7	2.4	3.0	2.5
Ghana	5.5	5.7	7.2	7.2	8.7	9.1	8.1	8.3	10.3	14.7	16.7	17.3	-15.1	-14.7	-11.3	-17.4	-14.3	-9.2	2.0
Greece	1.9	2.4	4.0	4.9	6.7	10.9	6.2	5.8	7.3	13.1	14.2	18.3	-4.9	-4.3	-1.6	-3.0	0.0	6.1	4.9
Hong Kong	3.4	2.9	2.6	0.9	0.5	1.1	3.7	3.0	3.1	3.2	2.8	2.9	3.4	2.8	3.6	2.6	3.9	3.7	2.8
Hungary	9.8	7.7	6.5	15.0	11.3	10.7	12.7	10.0	8.1	18.7	14.2	13.4	0.9	-1.3	-0.4	4.1	1.0	7.2	8.3
Iceland	7.5	8.4	8.4	17.7	18.5	20.0	5.6	7.1	8.2	18.1	20.5	23.9	-3.8	-1.9	-0.8	10.1	13.0	17.1	11.0
India	8.9	7.8	6.8	11.6	10.1	7.7	11.1	9.1	7.7	15.3	12.4	9.3	9.2	7.5	6.6	10.9	8.6	6.9	9.3
Indonesia	6.3	6.2	5.7	9.3	9.9	8.9	9.6	9.9	9.0	11.4	12.5	10.4	11.8	11.9	10.9	15.9	16.2	12.8	10.5
Ireland	6.8	6.7	6.5	9.6	9.3	9.0	6.5	6.2	6.0	11.0	10.3	10.1	3.8	3.2	3.2	8.0	6.8	8.1	7.3
Israel	8.6	8.6	8.2	11.2	10.9	9.5	11.8	11.2	9.6	17.9	15.5	13.0	12.6	11.5	9.2	18.7	15.6	12.6	12.0
Italy	1.2	1.8	2.5	0.4	1.8	2.7	2.3	2.7	2.9	4.1	4.7	4.6	-0.5	1.3	2.3	1.3	4.3	4.5	2.5
Jamaica	4.4	4.7	5.4	6.0	6.4	7.2	3.8	3.8	4.7	5.6	6.6	6.8	-5.7	-5.2	-3.4	-7.1	-5.3	-1.4	2.1
Japan	0.1	0.8	0.7	0.9	0.9	0.6	2.4	3.3	3.2	4.8	5.7	4.6	4.3	5.0	4.5	6.7	6.6	5.7	3.4
Jordan	2.1	2.4	2.7	-0.4	0.5	0.9	1.1	1.5	2.0	-1.1	0.1	0.7	-0.3	0.4	1.2	-1.6	0.4	1.4	0.8
Kazakhstan	1.1	2.0	1.6	5.6	6.0	4.6	-8.1	-7.3	-5.5	-4.2	-2.6	0.5	-7.3	-6.8	-4.8	-10.2	-9.2	-5.3	-2.8
Kenya	2.8	2.8	2.7	3.0	2.7	2.3	2.0	2.0	2.0	2.3	2.1	1.9	1.4	1.4	1.4	-0.3	-0.5	-0.4	1.8
Korea South	3.4	3.1	3.1	4.3	4.3	4.1	10.3	8.8	8.0	13.8	11.8	9.4	6.4	5.0	6.2	7.3	7.0	7.4	6.9
Kuwait	6.1	6.3	6.2	8.2	7.6	8.4	-0.5	0.1	0.7	-1.0	-0.6	2.9	-8.3	-7.2	-6.2	-13.9	-12.5	-5.9	-0.5
Latvia	4.8	5.0	5.4	8.4	8.7	8.5	-5.6	-5.4	-4.8	-6.0	-5.5	-5.9	-1.0	-1.0	-0.1	-3.3	-2.8	-3.3	-0.2
Lithuania	12.8	13.1	13.1	20.9	21.9	20.5	3.8	4.3	4.3	9.0	10.4	8.5	2.7	3.4	3.9	1.1	2.9	0.5	8.7
Luxembourg	6.0	4.3	3.3	6.2	4.2	3.7	5.0	3.3	2.9	5.4	4.2	4.0	3.1	2.0	1.9	3.2	2.5	3.2	3.8
Macedonia	-13.6	-12.5	-12.4	-15.6	-14.5	-14.5	-5.6	-4.9	-5.8	-5.5	-6.1	-7.4	-3.5	-3.2	-4.6	-5.1	-6.5	-7.5	-8.3
Malaysia	2.4	2.6	2.3	1.2	0.8	0.6	4.3	4.1	3.4	3.9	2.9	1.6	5.1	4.7	3.5	5.8	4.6	2.6	3.1
Malta	8.	8.	7.	13	12	9.	3.	3.	2.	6.	4.	3.	1.	1.	-	1.	-	-	4.6

	1	5	3	.2	.4	5	5	4	2	2	6	2	1	3	0.5	7	0.3	2.8	
Mauritius	7.7	7.8	6.3	11.1	9.5	6.8	12.4	12.2	9.4	18.1	15.2	10.3	7.4	7.7	7.3	12.3	11.5	9.6	10.1
Mexico	9.4	9.1	8.1	12.0	11.2	9.5	8.9	8.8	7.9	12.7	12.1	10.1	6.8	6.3	5.2	8.1	6.3	4.6	8.7
Morocco	7.3	7.0	6.2	9.6	8.9	7.9	-8.0	-8.4	-9.4	-13.1	-14.1	-14.9	-9.4	-9.4	-10.6	-14.3	-15.3	-16.9	-5.4
Namibia	0.6	-0.1	-1.2	1.2	-0.1	-1.2	0.0	-0.2	-0.1	0.6	1.4	1.7	1.0	0.1	0.1	2.1	3.3	5.1	0.8
Netherlands	6.4	5.2	4.4	7.6	5.9	5.6	3.6	2.5	2.3	4.4	3.2	3.9	3.9	2.4	2.1	4.6	3.0	4.0	4.2
New Zealand	4.6	4.4	4.6	5.3	5.3	4.9	6.1	6.1	6.6	9.5	10.0	9.9	5.1	5.8	6.9	8.6	10.0	10.1	6.9
Nigeria	6.4	6.7	6.2	12.5	12.1	9.4	-0.7	-0.3	-1.1	3.8	3.2	-0.7	9.5	10.1	8.4	17.9	17.0	9.7	7.2
Norway	8.2	8.0	6.7	10.8	9.3	8.8	9.6	9.9	8.3	14.5	12.7	11.7	10.3	9.8	8.0	15.1	12.4	11.6	10.3
Oman	10.6	10.1	9.0	15.2	14.1	12.1	7.6	7.4	6.6	12.6	11.8	10.8	1.8	1.4	0.4	2.5	1.3	0.1	7.5
Pakistan	1.1	1.0	1.7	-4.1	-1.8	-0.7	2.4	2.2	2.0	-0.9	0.5	0.3	1.3	0.4	0.1	-3.0	-2.1	-0.8	0.0
Peru	10.6	8.1	7.4	9.3	7.7	7.0	8.2	7.2	7.3	8.6	7.9	7.6	11.8	11.8	12.8	15.2	15.5	13.5	9.9
Philippines	2.1	2.7	2.7	1.0	1.1	2.3	5.3	5.3	4.7	7.3	6.8	6.2	7.5	7.1	6.2	7.3	6.1	4.3	4.8
Poland	5.3	3.4	0.2	5.2	0.5	-1.8	9.5	6.7	2.6	11.2	5.1	0.6	-9.4	-11.3	-13.6	-16.1	-20.7	-19.2	-2.3
Portugal	4.2	4.1	4.8	7.0	7.8	8.7	5.5	5.4	6.0	11.8	12.2	13.0	-0.1	-0.1	1.9	2.8	4.5	8.2	6.0
Qatar	13.0	13.1	12.8	17.5	17.2	15.7	12.6	12.9	12.8	18.3	18.2	17.1	16.0	16.3	15.7	23.1	22.6	20.9	16.4
Romania	4.2	4.1	6.0	2.6	5.0	7.3	1.2	2.0	5.3	3.8	7.7	10.5	-3.5	-4.1	-3.1	-7.1	-5.8	-6.4	1.6
Russian	10.3	11.4	11.6	15.9	17.3	15.8	5.5	5.4	5.8	9.8	10.3	10.0	2.1	2.9	4.6	3.2	6.3	4.7	8.5
Saudi Arabia	7.0	8.0	8.1	11.0	11.9	11.2	1.9	3.2	3.4	4.0	5.3	4.5	2.5	3.3	3.2	3.0	3.4	3.2	5.4
Serbia	0.8	2.3	4.1	4.5	6.6	8.5	-0.8	-0.7	0.4	0.7	1.1	1.5	-0.9	-0.5	0.3	-9.9	-9.2	-9.3	0.0
Singapore	3.0	3.9	3.9	3.6	3.9	3.6	4.7	5.1	4.7	6.7	6.5	5.6	5.2	6.1	5.6	8.6	8.5	6.6	5.3
Slovak Republic	-0.2	-0.4	-0.3	-4.9	-5.5	-3.6	-1.1	-0.9	-0.7	-3.5	-3.7	-1.6	-15.5	-12.1	-7.5	-23.2	-15.8	-8.7	-6.1
Slovenia	-2.6	-2.5	-2.8	-3.1	-2.5	-1.2	-3.8	-3.6	-4.0	-6.5	-5.7	-5.4	-1.4	-1.0	-1.8	-9.7	-8.5	-8.2	-4.1
South Africa	3.5	3.8	3.2	4.0	3.7	3.7	4.7	5.4	4.5	6.4	6.6	5.9	2.2	3.8	3.9	1.8	3.6	3.4	4.1
Spain	3.	3.	3.	2.	2.	4.	3.	3.	3.	3.	3.	5.	0.	-	-	-	-	0.	2.0

	1	3	4	5	4	0	7	7	8	9	5	4	5	1.3	0.4	2.7	4.2	8	
Sri Lanka	8.2	7.6	6.0	12.3	11.0	8.9	15.1	13.6	10.1	21.9	18.7	13.3	15.7	14.9	12.4	23.8	21.6	16.6	14.0
Sweden	5.4	5.8	4.9	6.2	5.7	4.7	4.8	5.6	5.2	6.1	6.2	5.8	3.7	4.2	2.8	3.8	2.4	2.5	4.8
Switzerland	6.8	6.5	5.2	8.6	6.8	6.0	5.7	5.5	4.4	8.5	6.7	6.3	5.9	5.6	3.9	7.9	5.4	4.5	6.1
Taiwan	3.1	3.1	2.3	3.4	2.4	2.5	2.8	2.8	2.7	3.3	2.7	3.2	4.0	3.5	3.8	3.8	2.5	4.7	3.1
Thailand	1.2	0.3	-0.1	-1.6	-2.0	-1.2	8.4	7.4	6.0	8.8	7.2	6.2	11.8	10.4	7.9	15.9	12.6	9.3	6.0
Tunisia	5.9	5.8	5.0	6.4	5.7	4.5	5.4	5.8	5.2	7.2	7.0	5.7	-7.3	-7.3	-7.7	-11.6	-12.2	-11.0	0.7
Turkey	14.6	12.5	10.7	23.8	21.1	19.6	11.3	8.8	8.1	16.2	15.2	14.6	7.5	5.6	5.1	13.0	10.1	11.4	12.7
Ukraine	15.0	14.5	14.8	25.2	25.7	27.8	9.8	9.5	10.0	26.1	26.7	27.7	-8.3	-9.0	-8.7	-4.5	-4.5	-2.3	10.9
United Kingdom	3.3	3.3	3.8	3.3	4.0	4.5	3.7	3.1	3.8	4.9	5.4	5.6	4.3	3.4	3.8	5.9	5.8	6.1	4.3
United States	5.8	5.4	4.8	6.4	5.7	4.7	3.8	3.4	3.0	4.0	3.3	3.1	6.1	5.4	4.2	7.6	6.1	4.5	4.8
Venezuela	9.7	11.0	8.3	10.7	9.3	5.2	18.0	18.4	11.6	24.5	18.3	9.1	31.5	30.4	18.2	44.7	33.9	16.8	18.3
Viet Nam	16.3	13.6	9.6	25.4	18.4	7.5	-4.6	-4.1	-2.5	-3.4	-2.8	-1.6	9.4	9.4	8.0	14.0	11.2	8.5	7.4

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