International Stock Return Predictability What is the Role of the United States?

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Abstract

We present significant evidence of out-of-sample equity premium predictability for a host of industrialized countries over the postwar period. There are important differences, however, in the nature of equity premium predictability between the United States and other developed countries. Taken collectively, U.S. economic variables are significant out-of-sample predictors of the U.S. equity premium that clearly outperform lagged international stock returns. In contrast, lagged international stock returns—especially lagged U.S. returns—substantially outperform economic variables as out-of-sample equity premium predictors for non-U.S. countries, pointing to a leading role for the United States with respect to international return predictability. These predictability patterns are enhanced during economic downturns, linking return predictability to business-cycle fluctuations and information frictions involving the diffusion of news on macroeconomic fundamentals across countries. The leading role of the United States stands out during the recent global financial crisis: lagged U.S. stock returns deliver especially sizable gains for forecasting the monthly equity premium in other countries, evidenced by out-of-sample R^2 statistics of 10% or greater, more than triple the postwar average.

JEL classifications: C22, C53, G14, G15, G17

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1 Introduction

Stock return predictability is a central issue in financial economics. Correspondingly, a vast empirical literature exists on the predictability of U.S. aggregate stock market returns using economic variables. In summarizing this literature, Campbell (2000), Cochrane (2007), and Lettau and Ludvigson (2009) argue that U.S. returns contain a statistically and economically significant predictable component. Fama and French (1989), Campbell and Cochrane (1999), and Cochrane (2007), among others, contend that economic variables—such as valuation ratios, nominal interest rates, inflation rates, term and default spreads, and the consumption-wealth ratio[1]—predict returns because they capture rational fluctuations in expected returns relating to time-varying macroeconomic risk premiums. A number of researchers argue that market inefficiencies and information frictions also play an important role in generating return predictability; see, for example, Baker and Wurgler (2000) and Hong, Torous, and Valkanov (2007).

Several important studies consider stock return predictability in countries outside the United States, including Cutler, Poterba, and Summers (1991), Harvey (1991), Bekaert and Hodrick (1992), Campbell and Hamao (1992), Ferson and Harvey (1993), Solnik (1993), Ang and Bekaert (2007), and Hjalmarsson (2008). While these studies provide intriguing evidence that stock returns are predictable in other countries, they typically consider a limited number of countries or potential predictors, use relatively short data samples, and rely only on in-sample tests. It is thus difficult to ascertain the significance of return predictability in countries outside the United States.

To better understand the extent and nature of international stock return predictability, we extensively analyze stock return predictability in the United States and eleven other industrialized countries during the postwar period. Our analysis provides answers the following questions: Is stock return predictability an economically significant feature of countries outside the United States? Do similar variables predict returns in the Unites States and other countries? Are there important links

[1]Representative studies include Fama and French (1988, 1989), Campbell and Shiller (1988, 1998), Kothari and Shanken (1997), Cochrane (2008), and Pástor and Stambaugh (2009) for valuation ratios; Fama and Schwert (1977), Campbell (1987), Breen, Glosten, and Jagannathan (1989), and Ang and Bekaert (2007) for nominal interest rates; Nelson (1976), Fama and Schwert (1977), and Campbell and Vuolteenaho (2004) for inflation rates; Campbell (1987) and Fama and French (1989) for term and default spreads; Baker and Wurgler (2000) and Boudoukh, Michaely, Richardson, and Roberts (2007) for corporate issuing activity; and Lettau and Ludvigson (2001) for the consumption-wealth ratio.

among national equity markets with respect to return predictability? These questions relate to an overarching issue: Does the United States play a special role with respect to international stock return predictability? The recent global financial crisis highlights the importance of these questions, as the crisis has been characterized by deteriorating macroeconomic fundamentals—originating primarily in the United States—and sharply falling share prices across many countries.

For the equity premium in each country, we consider three groups of potential predictors. The first group comprises ten domestic economic variables representative of the literature, such as the dividend yield, nominal interest rates, inflation rate, and term spread. The second group consists of U.S. economic variables. This is motivated by Harvey (1991) and Ferson and Harvey (1993), who find that U.S. economic variables help to predict returns in other countries. The final group of potential predictors includes lagged excess stock returns from all twelve countries. Our consideration of lagged excess returns from multiple countries allows us to study lead-lag relationships in international stock returns.

Following a number of recent studies (e.g., Campbell and Thompson, 2008; Goyal and Welch, 2008; Rapach, Strauss, and Zhou, 2009), we focus on out-of-sample tests of equity premium predictability, which are less susceptible than in-sample tests to data mining and overfitting.[2] We use the historical average forecast, which corresponds to the well-known random walk (with drift) model, as a natural benchmark. The historical average forecast is a stringent out-of-sample benchmark: Goyal and Welch (2008) show that a large number of economic variables with in-sample predictive ability in the literature fail to consistently outperform the historical average forecast of the U.S. equity premium in out-of-sample tests.[3]

In addition to individual predictive regression model forecasts, we employ combination forecasts. This is motivated by Rapach, Strauss, and Zhou (2009), who show that simple combinations of individual predictive regression model forecasts of the U.S. equity premium consistently outperform the historical average benchmark, despite the inability of individual forecasts to consistently beat the historical average.[4] For each country, we consider combination forecasts based on the three different groups of potential predictors, as well as all potential predictors taken together.

[2]While it is widely believed that out-of-sample tests are more reliable than in-sample tests, there are some philosophical issues relating to the choice of in-sample versus out-of-sample tests (e.g., Inoue and Kilian, 2004; Lettau and Ludgivson, 2009).

[3]The influential study of Goyal and Welch (2008) won the Michael Brennan Best Paper Prize for the *Review of Financial Studies*.

[4]The success of the combination forecast approach stems in part from its ability to improve forecast accuracy in environments with substantial model uncertainty and instability; see, for example, Hendry and Clements (2004), Clements and Hendry (2006), Timmermann (2006), and Rapach, Strauss, and Zhou (2009).

Previewing our results, we find statistically and economically significant evidence of out-of-sample predictability in the monthly equity premium for eleven of the twelve industrialized countries during the 1966:01–2009:05 period.[5] Nevertheless, we identify important differences across countries in the ability of the various groups of predictors to forecast excess returns. Consider the first group of predictors, ten domestic economic variables for each country. Despite the inability of individual U.S. economic variables to consistently outperform the historical average benchmark for forecasting the U.S. equity premium, a combination forecast based on all ten economic variables collectively beats the historical average benchmark by statistically and economically significant margins, similar to Rapach, Strauss, and Zhou (2009). Individual domestic economic variables also fail to consistently outperform the historical average equity premium forecast for the eleven other industrialized countries. In contrast to the United States, however, combination forecasts based on domestic economic variables also fail to significantly outperform the historical average benchmark for nine of the eleven other countries. The exceptions are Belgium and Germany; even for these countries, however, the magnitudes of the out-of-sample gains are considerably smaller than those for the United States. In short, while domestic economic variables in combination significantly predict the U.S. equity premium, they exhibit substantially weaker out-of-sample predictive ability for the equity premium in other industrialized countries.

The second group of predictors, U.S. economic variables, generally demonstrate greater out-of-sample predictive ability than domestic economic variables for non-U.S. countries. Combination forecasts based on U.S. economic variables significantly outperform the historical average benchmark equity premium forecast for Belgium, Canada, Germany, and the Netherlands. Nevertheless, the magnitudes of the out-of-sample forecasting gains are limited compared to the predictive power of U.S. economic variables for the U.S. equity premium. Overall, economic variables produce substantial out-of-sample forecasting gains for the U.S. equity premium, but they generate smaller or no gains for the equity premium in non-U.S. countries.

A different pattern emerges with respect to the out-of-sample predictive ability of the third group of predictors, lagged international stock returns. Taken individually or in combination, lagged international excess stock returns do not significantly outperform the historical average benchmark for forecasting the U.S. equity premium. In sharp contrast, a number of individual lagged international excess stock returns, as well as combination forecasts based on lagged inter-

[5]The fact that we find substantial evidence of return predictability at a monthly horizon is important, since much of the significant in-sample evidence of return predictability in the literature occurs at longer horizons, and long-horizon predictability raises a number of econometric issues due to overlapping observations (e.g., Richardson and Stock, 1989; Valkanov, 2003; Ang and Bekaert, 2007; Boudoukh, Richardson, and Whitelaw, 2008).

national excess returns, significantly outperform the historical average benchmark for the equity premium in other industrialized countries. Lagged U.S. excess returns appear especially important: they produce statistically and economically sizable forecasting gains in ten of the eleven other countries. These gains are typically larger than those associated with other countries' lagged excess returns. The United States thus appears to play a leading role with respect to international return predictability.

Our finding that U.S. returns lead returns in other countries has an interesting parallel in the literature on cross-serial correlation in portfolios of individual U.S. stocks sorted on size, analyst coverage, volume, and/or industry (e.g., Lo and MacKinlay, 1990; Brennan, Jegadeesh, and Swaminathan, 1993; Chordia and Swaminathan, 2000; Hou, 2007). This literature finds that returns on particular portfolios lead returns on other portfolios; for example, Lo and MacKinlay (1990) present evidence that returns on portfolios of U.S. large-cap stocks lead returns on portfolios of U.S. small-cap stocks. We extend this literature by showing that important lead-lag relationships also exist across countries.

An explanation for lead-lag relationships among portfolios is information frictions: certain stocks adjust more slowly to economy-wide information. For example, Hong, Torous, and Valkanov (2007) recently posit that many investors specialize in particular segments of the equity market; information-processing limitations can then cause information originating in particular segments to diffuse slowly across the broader market, thereby creating return predictability. In our international context, if many investors focus more intently on the U.S. equity market, information on macroeconomic fundamentals relevant for equity markets worldwide diffuses more slowly to other countries. Lagged U.S. returns will then have predictive ability with respect to returns in other countries.

To further analyze lead-lag relationships in international returns, we test for Granger causality between U.S. and non-U.S. excess returns, following Brennan, Jegadeesh, and Swaminathan (1993), Hameed (1997), and Chordia and Swaminathan (2000) in the U.S. domestic context. This guards against spurious evidence of lead-lag relationships in portfolio returns that arises from autocorrelation in portfolios returns combined with contemporaneously correlated portfolio returns (Boudoukh, Richardson, and Whitelaw, 1994; Hameed, 1997; Chordia and Swaminathan, 2000). Our results continue to point to a leading role for the United States: U.S. returns Granger cause returns in nearly every other country (using both in-sample and out-of-sample tests), while the converse does not hold.

We glean additional insight into the nature of international stock return predictability by analyzing predictability in each country over different phases of the business cycle. More specifically, we compute out-of-sample forecasting gains separately over "classical" business-cycle expansions and recessions. The classical business cycle corresponds to the basic approach of the National Bureau of Economic Research with respect to the "official" dating of U.S. business-cycle peaks and troughs. Using classical business-cycle dates from various sources for the twelve industrialized countries, we find that out-of-sample return predictability is often markedly enhanced during recessions. Moreover, the differences in the forecasting ability of the various predictors that we identify over the full out-of-sample period are magnified during recessions. In particular, lagged U.S. returns generate even more sizable forecasting gains during recessions in non-U.S. countries. The enhanced predictive power of lagged U.S. returns during recessions suggests that U.S. equity prices quickly incorporate information relevant for changing worldwide economic conditions, while this information diffuses more slowly to other countries.

As a final exercise, we analyze out-of-sample stock return predictability during the recent global financial crisis by using a 2007:01–2009:05 forecast evaluation period. Given the international scope of the crisis and rapidly deteriorating macroeconomic conditions, this is an especially informative period. We are particularly interested in the relevance of the information flow frictions during the recent crisis, and, indeed, we find that lagged U.S. returns are especially useful for forecasting the equity premium in other countries during the crisis. Over the full out-of-sample period, Campbell and Thompson (2008) out-of-sample R^2 statistics based on lagged U.S. returns range from approximately 1% to 3% for many other industrialized countries, which are statistically and economically significant. These R^2 statistics jump to approximately 10% to 13% during the recent crisis. This is a very high range, highlighting the leading role played by the United States with respect to international return predictability.

The remainder of the paper is organized as follows. Section 2 outlines the formation and evaluation of out-of-sample equity premium forecasts. Section 3 describes the data and reports out-of-sample results for the twelve industrialized countries over the 1966:01–2009:05 forecast evaluation period. Section 4 presents Granger causality test results for country excess returns. Section 5 examines the out-of-sample equity premium predictability separately over business-cycle expansions and contractions, as well as during the recent global crisis. Section 6 concludes.

2 Econometric Methodology

We begin with a conventional predictive regression model for country i's monthly equity premium:

$$r_{i,t+1} = \alpha + \beta x_t + \varepsilon_{i,t+1}, \tag{1}$$

where $r_{i,t}$ is the return on a broad stock market index for country i in excess of the risk-free interest rate for country i, x_t is a potential predictor of $r_{i,t+1}$, and $\varepsilon_{i,t+1}$ is a disturbance term. Observe that, following Solnik (1993), Ang and Bekaert (2007), and Hjalmarsson (2008), among others, the equity premium is measured in the national currency. As noted by Solnik (1993), the national currency equity premium is approximately equal to the currency-hedged equity premium for investors from any country due to interest rate parity, where the forward premium equals the difference in the risk-free interest rates. The approximation becomes more accurate for shorter time periods (monthly returns in our case). Solnik (1993) also points out that working with national currency returns obviates the need to develop a risk premium model for exchange rates, allowing us to focus on time-varying expected returns in equity markets.

Following the recent studies of Campbell and Thompson (2008), Goyal and Welch (2008), and Rapach, Strauss, and Zhou (2009), we generate out-of-sample equity premium forecasts for country i using a recursive (expanding) estimation window. More specifically, we first divide the total sample of T observations into in-sample and out-of-sample components comprised of the first m and last q observations, respectively. The initial out-of-sample forecast of country i's equity premium is given by

$$\hat{r}_{i,m+1} = \hat{\alpha}_m + \hat{\beta}_m x_m, \tag{2}$$

where $\hat{\alpha}_m$ and $\hat{\beta}_m$ are the ordinary least squares (OLS) estimates of α and β, respectively, in (1) generated by regressing $\{r_{i,t}\}_{t=2}^{m}$ on a constant and $\{x_t\}_{t=1}^{m-1}$. The next out-of-sample forecast is given by

$$\hat{r}_{i,m+2} = \hat{\alpha}_{m+1} + \hat{\beta}_{m+1} x_{m+1}, \tag{3}$$

where $\hat{\alpha}_{m+1}$ and $\hat{\beta}_{m+1}$ are generated by regressing $\{r_{i,t}\}_{t=2}^{m+1}$ on a constant and $\{x_t\}_{t=1}^{m}$. We proceed in this manner through the end of the out-of-sample period, leaving us with a series of q out-of-sample forecasts for country i's equity premium, $\{\hat{r}_{i,t+1}\}_{t=m}^{T-1}$. Apart from data reporting conventions and revisions, this out-of-sample exercise simulates the situation of a forecaster in real time.[6] As indicated in Section 1, our focus on out-of-sample tests follows a number of recent

[6]Data reporting conventions and revisions are only relevant for a few of the predictors we consider, namely, inflation and industrial production. To allow for the lag in the reporting of these data, we also computed equity premium forecasts with with x_{t-1} replacing x_t in (1). The results are qualitatively unchanged.

studies and is designed to provide more reliable inferences regarding return predictability.

Following Campbell and Thompson (2008) and Goyal and Welch (2008), we use the historical average forecast, $\bar{r}_{i,t+1} = \sum_{j=1}^{t} r_{i,j}$, as the benchmark forecast. This benchmark corresponds to the random walk with drift or constant expected excess return model. Intuitively, if x_t contains information useful for forecasting $r_{i,t+1}$, the predictive regression model forecast, which incorporates information from x_t, should deliver superior forecasts relative to the historical average forecast, which ignores x_t. Goyal and Welch (2008) show that the historical average forecasts is a stringent benchmark.

In Section 3, we consider a large number of potential predictors and thus a large number of individual predictive regression model forecasts. In this setting, it can be beneficial to combine information from individual predictive regression model forecasts. In particular, Rapach, Strauss, and Zhou (2009) show that while numerous individual predictive regression models based on popular economic variables are unable to consistently outperform the historical average with respect to forecasting the U.S. equity premium, a simple combination of individual forecasts does consistently outperform the historical average. Rapach, Strauss, and Zhou (2009) provide an extended analysis of how combination forecasts can improve equity premium prediction. Intuitively, combining forecasts incorporates useful information from many predictors while stabilizing individual forecasts and thus avoiding the numerous "false signals" in individual forecasts. In light of this, we consider combination forecasts that take the form of simple averages of various groups of individual predictive regression model forecasts. While more sophisticated combining methods are available, simple combining methods often outperform more complicated methods (e.g., Timmermann, 2006).

To evaluate the individual predictive regression model and combination forecasts against the historical average benchmark, we calculate the Campbell and Thompson (2008) out-of-sample R^2 statistic, R^2_{OS}. This statistic measures the reduction in mean square prediction error (MSPE) for an individual predictive regression model or combination forecast relative to the historical average forecast:

$$R^2_{OS} = 1 - \frac{\sum_{k=1}^{q} (r_{i,m+k} - \hat{r}_{i,m+k})^2}{\sum_{k=1}^{q} (r_{i,m+k} - \bar{r}_{i,m+k})^2}, \tag{4}$$

where $\hat{r}_{i,m+k}$ represents an individual predictive regression model or combination forecast. When $R^2_{OS} > 0$, the predictive regression model or combination forecast thus has a lower MSPE than the historical average benchmark.

To test the null hypothesis that the predictive regression model or combination forecast is not more accurate than the historical average benchmark ($R^2_{OS} \leq 0$) against the alternative hypothesis that the predictive regression model or combination forecast has a lower MSPE ($R^2_{OS} > 0$), we use the Clark and West *MSPE-adjusted* statistic. This is a variant of the popular Diebold and Mariano (1995) and West (1996) statistic. While the Diebold and Mariano (1995) and West (1996) statistic has a standard normal asymptotic distribution when comparing forecasts from nonnested models, it has a nonstandard distribution when comparing forecast from nested models (Clark and McCracken, 2001; McCracken, 2007). Our forecast comparison clearly involves nested models, since setting $\beta = 0$ in (1) yields the constant expected excess return model. Clark and West (2007) modify the Diebold and Mariano (1995) and West (1996) statistic to develop a test based on the standard normal distribution that produces valid asymptotic inferences when comparing forecast from nested models. More specifically, the Clark and West (2007) *MSPE-adjusted* statistic is conveniently computed by first defining

$$f_{i,t+1} = (r_{i,t+1} - \bar{r}_{i,t+1})^2 - [(r_{i,t+1} - \hat{r}_{i,t+1})^2 - (\bar{r}_{i,t+1} - \hat{r}_{i,t+1})^2] \tag{5}$$

and then regressing $\{f_{i,s+1}\}_{s=m}^{T-1}$ on a constant; the t-statistic corresponding to the constant is the *MSPE-adjusted* statistic. A p-value for a one-sided (upper-tail) test is generated using the standard normal distribution. In Monte Carlo simulations, Clark and West (2007) find that the *MSPE-adjusted* statistic has good finite-sample properties.

Given the nature of stock return predictability, R^2_{OS} statistics are typically small at the monthly horizon. Nevertheless, Kandel and Stambaugh (1996), Xu (2004), and Campbell and Thompson (2008) demonstrate that even an apparently small degree of predictability can be economically important. For example, Campbell and Thompson (2008) show that an R^2_{OS} greater than approximately 0.5% for monthly returns corresponds to economically meaningful predictability gains with respect to the U.S. equity premium.

3 Out-of-Sample Forecasting Results

3.1 Data

We employ monthly data for 1956:02–2009:05 for twelve industrialized countries (Australia, Belgium, Canada, France, Germany, Italy, Japan, the Netherlands, Sweden, Switzerland, the United Kingdom, and the United States). The selection of countries and sample period are dictated by data availability and our desire to analyze out-of-sample return predictability for a relatively large number of countries for a relatively long postwar sample. Most of the data are from Global Financial

Data. The Data Appendix describes the data and their sources in detail.

Table 1 reports summary statistics for the monthly equity premium (in percent) for the twelve countries. The equity premium is computed as the return on a broad country index in excess of the country's Treasury bill rate. The average monthly equity premium ranges from 0.21% (Italy) to 0.67% (Sweden). The standard deviations and maximum/minimum values clearly indicate the high volatility of excess stock returns in each country, with Italy displaying the greatest volatility over the sample. Australia, the Netherlands, Sweden, Switzerland, and the United States all have Sharpe ratios greater than or equal to 0.10, while Belgium and Italy have the lowest Sharpe ratios (0.05 and 0.03, respectively). A number of European countries exhibit fairly sizable positive autocorrelation in their returns, ranging from 0.10 to 0.15. Japan and the United States display the weakest autocorrelations (0.06 for both countries).

For each country, we consider ten monthly economic variables as potential predictors of country stock returns. Our group of ten variables is well representative of the economic variables found in the return predictability literature. For example, our group includes many of the variables considered in Cremers (2002) and Goyal and Welch (2008), two studies that investigate the predictive ability of a host of economic variables from the literature with respect to the U.S. equity premium. For each country, we consider the following ten economic variables:

- *Dividend-price ratio (log)*, DP: difference between the log of dividends and the log of stock prices, where dividends are measured using a one-year moving sum.
- *Inflation rate*, INF: growth rate of the consumer price index (CPI).
- *Change in the inflation rate*, dINF: first difference in the inflation rate (designed to capture unexpected inflation shocks).
- *Treasury bill rate*, BILL: interest rate on a three-month Treasury bill.
- *Long-term bond yield*, BOND: long-term government bond yield.
- *Long-term bond return*, LTR: return on long-term government bonds.
- *Term spread*, TERM: difference between the long-term bond yield and the Treasury bill rate.
- *Real oil price growth*, OIL: national currency oil price growth rate minus the CPI inflation rate.

- *Industrial production growth*, IPG: growth rate of industrial production.

- *Real exchange rate growth*, RXR: (rate of appreciation of the national currency versus the U.S. dollar) plus (national CPI inflation rate) minus (U.S. CPI inflation rate).[7]

3.2 Out-of-Sample Predictability Using Economic Variables

Table 2 reports out-of-sample forecasting results for individual predictive regression model and combination equity premium forecasts based on economic variables. We use the first ten years of our total sample, 1956:02–1965:12, as the in-sample period, leaving us with the 1966:01–2009:05 out-of-sample period for forecast evaluation. This relatively long out-of-sample period covers many important global economic events, including the oil price shocks and bear markets of the 1970s, the bull markets of much of the 1980s and 1990s, the advent of the European Economic and Monetary Union (EMU), the sharp drop in global equity prices in 2000, and the recent global financial crisis. In addition to these global events, the out-of-sample period covers a number of significant country-specific events, such as German reunification and Japan's "lost decade." In summary, 1966:01–2009:05 represents a challenging and informative period to evaluate equity premium forecasts in industrialized countries.

For each country, the upper half of Table 2 presents R^2_{OS} statistics for individual predictive regression models based on the ten individual domestic economic variables, signified by the OWN suffix, as well as the R^2_{OS} for a combination forecast formed as the average of the ten individual predictive regression model forecasts, denoted ECON-OWN. In the lower half of Table 2, motivated by Harvey (1991) and Ferson and Harvey (1993), we present R^2_{OS} statistics for individual predictive regression model forecasts for non-U.S. countries based on U.S. economic variables, signified by the USA suffix.[8] Finally, R^2_{OS} statistics are reported for combination forecasts based on U.S. economic variables as a group, ECON-USA, as well as combination forecasts based on domestic and U.S. economic variables taken together, ECON-OWN-USA. As described in Section 2, we use Clark and West (2007) p-values to assess the statistical significance of the R^2_{OS} statistics.

The upper half of Table 2 shows that predictive regression model forecasts based on individual domestic economic variables rarely significantly outperform the historical average benchmark.

[7] For the United States, we measure RXR as the average rate of appreciation of the dollar against the eleven other countries' currencies plus the U.S. CPI inflation rate minus the average CPI inflation rate of the eleven other countries.

[8] We do not use the U.S. OIL and RXR variables as equity premium predictors for the other countries, since the U.S. and other country OIL variables behave very similarly and RXR for the other countries is already measured vis-á-vis the U.S. dollar.

When countries' own economic variables serve as individual predictors, only 15 of the 120 R^2_{OS} statistics (12.5%) are positive (nine are significant at conventional levels). The generally poor performance of individual predictive regression model forecasts is reminiscent of results reported for the United States in Goyal and Welch (2008). Our results for the other countries in Table 2 show that the Goyal and Welch (2008) findings for the United States extend to other industrialized countries.

Despite the poor overall predictive ability of the individual domestic economic variables, the ECON-OWN combination forecasts generate positive R^2_{OS} statistics for ten of the twelve countries (the exceptions are Sweden and Switzerland). Nevertheless, only three of the R^2_{OS} statistics are significant at conventional levels, and only two—for Germany and the United States—are greater than the Campbell and Thompson (2008) benchmark of 0.5% for monthly excess returns signalling economic significance. The R^2_{OS} is 0.71% for Germany and a very sizable 1.26% for the United States. The R^2_{OS} statistics for the German and U.S. ECON-OWN combination forecasts may appear surprising, since they are based on individual predictive regression model forecasts with only one or two positive R^2_{OS} statistics, each of which is less than the combination forecast R^2_{OS}. The result for the United State agrees with Rapach, Strauss, and Zhou (2009), who show how combining individual forecasts based on economic variables substantially improves U.S. equity premium prediction by stabilizing individual forecasts. As indicated in Section 2, combining forecasts incorporates information from numerous economic variables while stabilizing individual predictive regression model forecasts.[9] While a combination forecast based on domestic economic variables substantially improves out-of-sample U.S. equity premium predictability, the results for the other countries show that this only carries over to a limited degree to non-U.S. countries. There is thus a dichotomy among countries in the upper half of Table 2: domestic economic variables appear useful for forecasting the German and especially the U.S. equity premium, at least when domestic variables are used in combination, but they appear substantially less informative for equity premium forecasting in other industrialized countries.

The results in the lower half of Table 2 indicate that U.S. economic variables taken individually are unable to consistently deliver out-of-sample equity premium predictability in non-U.S. countries. The R^2_{OS} statistics for the individual predictive regression models based on U.S. economic

[9]Following Goyal and Welch (2008), we also computed the differences in cumulative square prediction error between the combination and historical average forecasts. This is informative for analyzing the ability of the combination forecast to consistently beat the historical average over the postwar era. The results, not reported for brevity, indicate that the German and U.S. combination forecast outperform the historical average on a reasonably consistent basis; this is not the case for individual predictive regression models in Table 2.

variables are significant in 17 out of 88 cases (19.32%), only a slightly higher proportion than the forecasts based on individual domestic economic variables in the upper half of the table. Again similar to the upper half of Table 2, the combination forecast based on the individual U.S. economic variables, ECON-USA, produces a positive R^2_{OS} in most of the non-U.S. countries, despite the typically poor performance of the individual forecasts. Nevertheless, the R^2_{OS} statistics for the ECON-USA combination forecasts are generally limited in their economic significance; only Belgium and Canada have R^2_{OS} statistics above 0.5% (0.62% and 0.73%, respectively).

The R^2_{OS} statistics for combination forecasts based on both domestic and U.S. economic variables, ECON-OWN-USA, typically lie between the R^2_{OS} statistics for the ECON-OWN and ECON-USA combination forecasts. The R^2_{OS} for the ECON-OWN-USA combination forecast is above 0.5% and significant at the 1% level for Belgium, Canada, and Germany, but these statistics are still less than half the R^2_{OS} for the U.S. ECON-OWN combination forecast. Overall, the R^2_{OS} statistic of 1.26% for the U.S. ECON-OWN combination forecast is well above the R^2_{OS} statistics for the other combination forecasts; that is, the out-of-sample predictive ability of economic variables shows up substantially more strongly and consistently for the United States than other industrialized countries over the postwar period.

It is somewhat puzzling that economic variables deliver significantly larger out-of-sample forecasting gains for the U.S. equity premium relative to the equity premium in other industrialized countries, especially given that we consider the same types of economic variables across countries. From a rational asset-pricing perspective, economic variables capture time-varying expected returns relating to changing macroeconomic risk premiums. Why do the same types of economic variables we consider appear to track time-varying expected returns substantially more accurately in the United States than in other industrialized countries? Is the U.S. market more efficient in pricing macroeconomic risks? While it is difficult to decisively answer these questions, we present evidence in the next subsection and Sections 4 and 5 consistent with the view that information relevant for worldwide macroeconomic conditions is incorporated more quickly into U.S. share prices than share prices in other countries.

3.3 Out-of-Sample Predictability Using Lagged Country Returns

We next analyze the out-of-sample predictive power of lagged international excess returns. This exercise is in the spirit of Lo and MacKinlay (1990), Brennan, Jegadeesh, and Swaminathan (1993), Chordia and Swaminathan (2000), and Hou (2007), among others, who analyze cross-serial correlation in portfolios of individual U.S. stocks sorted on different characteristics. These studies uncover significant lead-lag relationships in U.S. stock returns; for example, large-cap stock returns lead small-cap stock returns (Lo and MacKinlay, 1990). We investigate such lead-lag relationships among country excess returns in an out-of-sample framework.

Table 3 reports R^2_{OS} statistics for individual predictive regression models based on lagged country excess returns, signified by the LRET prefix. For each country, we also report the R^2_{OS} for a combination forecast formed as an average of the twelve individual predictive regression model forecasts, denoted by LRET-ALL. For the individual predictive regression model forecasts, over half (65 out of 120, or 54.17%) of the R^2_{OS} statistics are significant at conventional levels. Looking down the main diagonal for the individual forecast results, the own lagged return is significant for eight countries, the exceptions being Germany, Japan, the United Kingdom, and the United States. Five of these R^2_{OS} statistics are greater than 0.5%, suggesting economic significance. While a number of countries exhibit significant out-of-sample autocorrelation, each of these countries displays out-of-sample cross-serial correlation that is stronger than the autocorrelation. Take, for example, Belgium. The R^2_{OS} for LRET-BEL in the third column of Table 3 is 1.93%, indicating a statistically and economically significant degree of out-of-sample predictability based on Belgium's own excess return. Nevertheless, the R^2_{OS} statistics for LRET-SWE, LRET-CHE, and LRET-USA in the third column are all greater than 1.93%, so that out-of-sample predictability appears stronger using other countries as opposed to Belgium's own lagged excess returns.

The out-of-sample predictive ability of LRET-USA stands out in Table 3. The R^2_{OS} for LRET-USA is statistically significant at the 1% level for ten of the twelve countries, with the United Kingdom and United States as the exceptions. The statistically significant R^2_{OS} statistics for LRET-USA are clearly economically significant as well, ranging from 1.39% (France) to 3.07% (Germany). For most countries, the R^2_{OS} for LRET-USA is larger than or nearly equal to the R^2_{OS} for any of the other LRET forecasts. Lagged excess returns for Canada, the Netherlands, Sweden, Switzerland, and the United Kingdom are also statistically and economically significant out-of-sample equity premium predictors for a number of countries.

The penultimate line in Table 3 shows that the LRET-ALL combination forecast generates statistically and economically significant out-of-sample gains for ten of the twelve countries, the exceptions being the United Kingdom and United States. The significant R^2_{OS} statistics for LRET-ALL range from 0.93% (Canada) to 2.89% (Germany), indicating economic significance. The final line in Table 3 reports the R^2_{OS} for each country for a combination forecast based on all potential predictors (national and U.S. economic variables and lagged international excess returns), denoted by ALL.[10] The R^2_{OS} for the ALL combination forecast is statistically significant for eleven of the twelve countries, with the United Kingdom as the exception. Using a 0.5% benchmark, all of the R^2_{OS} statistics are economically significant for the ALL combination forecasts, although they are only slightly above or equal to 0.5% for Sweden, the United Kingdom, and the United States.

Taking the results in Tables 2 and 3 together, a sharp difference emerges in the nature of out-of-sample equity premium predictability between the United States and other industrialized countries. National economic variables in combination are significant out-of-sample predictors of the U.S. equity premium that clearly outperform lagged international excess returns as U.S. equity premium predictors. In contrast, for the other industrialized countries, lagged international excess returns—especially lagged U.S. excess returns—substantially outperform economic variables as out-of-sample equity premium predictors. In other words, economic variables are the primary source of the significant out-of-sample predictability in U.S. excess returns, while lagged international excess returns are predominantly responsible for the significant out-of-sample predictability in other countries' excess returns. The strong predictive ability of lagged U.S. excess returns across many countries in Table 3 points to a leading role for the United States with respect to international return predictability.

4 Granger Causality Tests for U.S. and Non-U.S. Returns

The ability of lagged U.S. excess returns to predict excess returns in other industrialized countries, while the converse does not hold, is reminiscent of the literature on cross-serial correlation in returns on U.S. stocks initiated by Lo and MacKinlay (1990), who show that returns on portfolios of large-cap stocks lead returns on portfolios of small-cap stocks. In a similar vein, Brennan, Jegadeesh, and Swaminathan (1993) demonstrate that returns on portfolios comprised of stocks with greater analyst coverage lead returns on portfolios comprised of less analyzed stocks, while Chordia and Swaminathan (2000) show that high-volume portfolios returns lead low-volume portfolio returns.

In the U.S. domestic context, these lead-lag patterns have been interpreted as evidence of information frictions and the underreaction of share prices in certain market segments to economy-wide information. Building on Merton (1987) and Hong and Stein (1999), Hong, Torous, Valkanov

[10]For the United States, the ALL combination forecast is based on the domestic economic variables and lagged international excess returns.

(2007) posit that investors specialize in particular market segments.[11] Information relevant for the broader economy that originates in particular segments only reaches investors in other segments with a lag, as information-processing limitations on the part of many investors prevent them from extracting relevant information from segments in which they do not specialize. Returns in particular market segments will thus lead returns in other segments.

In our international context, if many investors focus more intently on particular countries, information on macroeconomic fundamentals relevant for equity markets worldwide diffuses more slowly to other countries. Returns in countries that receive greater attention will thus lead returns in countries that receive less attention. It is natural to suppose that many investors specialize in the U.S. market, given that it is the largest and most prominent equity market in the world. Furthermore, the U.S. economy is the world's largest in terms of GDP, so that shocks to the U.S. economy have important implications for economic conditions in other industrialized countries.[12] Along the lines of Hong, Torous, and Valkanov (2007), with many investors focusing more intently on the U.S. market and with U.S. equity prices containing information relevant for global economies and equity markets, we would expect U.S. returns to lead returns in other countries (while the converse does not hold); this is precisely the pattern in out-of-sample predictability that we document in Section 3.

While our results as consistent with information frictions creating a leading role for the United States, there are potential concerns relating to spurious evidence of cross-serial correlation. Lo and MacKinlay (1990) and Boudoukh, Richardson, and Whitelaw (1994), among others, note that cross-serial correlation can be an artifact of market microstructure and thin trading. This is unlikely to be a serious concern for our applications, however, since we use monthly returns (as opposed to daily or weekly returns) and analyze broad indices for industrialized countries with relatively active equity markets. A related concern involves autocorrelation in particular portfolios in conjunction with contemporaneously correlated portfolio returns, which can generate spurious evidence of lead-lag relationships in portfolio returns (Boudoukh, Richardson, and Whitelaw, 1994; Hameed, 1997; Chordia and Swaminathan, 2000). In the context of portfolios of U.S. stocks, Brennan, Jegadeesh, and Swaminathan (1993), Hameed (1997), and Chordia and Swaminathan (2000) address this issue by employing Granger causality tests, which explicitly control for autocorrelation in portfolio returns. The fact that lagged U.S. excess returns produce forecasting gains in Table

[11] Hong, Torous, and Valkanov (2007) consider segmentation across U.S. industries.

[12] This is despite periodic claims of "decoupling." See Flood and Rose (2009) for recent evidence that business cycles have not become less synchronized across countries.

3 that are nearly always substantially greater than a country's own lagged excess return suggests that autocorrelation is not completely responsible for the predictive ability of lagged U.S. excess returns. Nevertheless, as a robustness check and analogous to the studies cited above, we test for Granger causality between U.S. and non-U.S. excess stock returns.

The following autoregressive distributed lag (ARDL) model, which can be viewed as one equation from a vector autoregression (VAR), provides the framework for the Granger causality tests:

$$r_{i,t+1} = a_0 + b_0 r_{i,t} + c_0 r_{j,t} + e_{i,t+1}, \tag{6}$$

where $r_{i,t}$ and $r_{j,t}$ are excess returns for countries i and j, respectively. Equation (6) is based on a VAR(1); including additional lags has little effect on the results. If $c_0 \neq 0$, then excess returns in country j Granger cause excess returns in country i. By including $r_{i,t}$ in (6), the Granger causality test directly controls for autocorrelation in country i's excess return. We implement in-sample Granger causality tests by estimating (6) via OLS for 1956:02–2009:05 and inspecting the t-statistic corresponding to $\hat{c}_0$, the OLS estimate of c_0.

We use the following procedure for out-of-sample Granger causality testing. We first generate recursive out-of-sample forecasts of $r_{i,t+1}$ based on (6) in a manner analogous to the predictive regression model forecast as described in Section 2. Out-of-sample forecasts based on (6) are then compared to forecasts based on an AR model for country i's excess return:

$$r_{i,t+1} = a_1 + b_1 r_{i,t} + e_{i,t+1}, \tag{7}$$

which is a restricted version of (6) that excludes country j's lagged excess return. We thus test whether including country j's lagged excess return improves forecasts of country i's excess return after controlling for the forecasting ability of country i's own lagged excess return. We use a suitably modified version of the Campbell and Thompson (2008) R^2_{OS} statistic to measure the reduction in MSPE for the ARDL model forecast relative to the AR model forecast, and statistical significance is based on a suitably modified version of the Clark and West (2007) test.

Table 4 reports the Granger causality test results. Given the leading role identified for the United States in Table 3, we focus on U.S. and non-U.S. country pairs in Table 4.[13] The first through third columns present in-sample estimation results for (6) when $r_{j,t}$ is the U.S. excess return and $r_{i,t}$ is the excess return for a non-U.S. country. A significant $\hat{c}_0$ estimate thus signals that U.S. excess returns Granger cause returns in the other country. With the exception of the United

[13] Complete results for Granger causality tests for all country pairs are available upon request from the authors.

Kingdom, the $\hat{c}_0$ estimates in the third column of Table 4 are all sizable and statistically significant. Furthermore, they are substantially larger in magnitude than the $\hat{b}_0$ estimates in the second column, so that lagged U.S. excess returns are economically more important than other countries' own lagged excess returns in predicting other countries' excess returns. It is also important to note that the $\hat{c}_0$ estimates in the third column of Table 4 are positive. This implies that non-U.S. returns underreact to U.S. return shocks. The $\hat{c}_0$ estimates are thus in line with information frictions and the slow diffusion of information across equity markets, as discussed above.

The fourth through sixth columns of Table 4 report estimation results for (6) when $r_{i,t}$ is the U.S. excess return and $r_{j,t}$ is the non-U.S. excess return, so that we test whether non-U.S. excess returns Granger cause U.S. excess returns. The $\hat{c}_0$ estimates in the sixth column are all small in magnitude and only one is significant at conventional levels (for Sweden). There is thus little evidence that non-U.S. excess returns Granger cause U.S. excess returns to an economically and statistically significant extent.

The final two columns of Table 4 report the out-of-sample Granger causality test results. With the exception of the United Kingdom, all of the R^2_{OS} statistics in the seventh column are positive, indicating that the ARDL forecasting model that includes lagged U.S. excess returns improves forecasts of non-U.S. excess returns relative to the AR benchmark model that excludes lagged U.S. excess returns. Eight of the ten positive R^2_{OS} statistics are economically and statistically significant (the exceptions are Canada and France); in these cases, there is thus strong out-of-sample evidence that U.S. excess returns Granger cause excess returns in other countries. The final column of Table 4 clearly demonstrates that non-U.S. excess returns do not Granger cause U.S. excess returns on an out-of-sample basis, since all of the R^2_{OS} statistics are negative.

Overall, the results in Table 4 indicate that lagged U.S. excess returns are typically significant in-sample and out-of-sample predictors of excess returns in other countries, after controlling for a country's own lagged returns, while the converse does not hold. The Granger causality test results thus demonstrate that the out-of-sample predictive ability of lagged U.S. excess returns in Table 3 is not solely an artifact of autocorrelation in individual country returns and contemporaneous correlation with U.S. returns. The nature of relationships between lagged U.S. excess returns and non-U.S. excess returns implies that non-U.S. returns underreact to U.S. return shocks.

5 Return Predictability Over Business-Cycle Phases

To explore links between international return predictability and business-cycle fluctuations, we analyze equity premium forecasts separately over business-cycle expansions and recessions. We consider "classical" business-cycle expansions and recessions, which correspond to turning points in the levels of important economic aggregates, such as real GDP. The National Bureau of Economic Research (NBER) Historical Business Cycle Dating Committee uses a classical approach to "officially" date U.S. business-cycle peaks and troughs. Recessions represent periods of contraction in general economic activity and are typically characterized by rapidly deteriorating macroeconomic fundamentals. Insofar as return predictability is linked to the real economy, predictability is likely to be greater during downturns.[14]

We use NBER business-cycle peaks and troughs to delineate expansions and recessions for the United States. For most of the other countries, peaks and troughs are from the Economic Cycle Research Institute. The Data Appendix describes the data sources in more detail and gives the complete set of peaks and troughs for each country.

Table 5 reports out-of-sample test results computed separately over expansions (Panel A) and recessions (Panel B). The second column of Table 5 reports the number of months during the 1966:01–2009:05 forecast evaluation period that each country spends in an expansionary or recessionary phase. The countries spend an average of 103 of 521 months (20%) of the forecast evaluation period in recession, with the number of months in recession ranging from 60 (12%) for Canada to 153 (29%) for Germany. The third through eighth columns of Table 5 present R^2_{OS} statistics for a variety of forecasts. For brevity, we concentrate on the results for combination forecasts, although we also report results for individual predictive regression model forecasts based on lagged U.S. excess returns, given their substantial predictive power in almost all countries in Table 3.[15]

Two findings are particularly noteworthy in Table 5. First, among the combination forecasts based on economic variables, the R^2_{OS} of 2.79% for the U.S. ECON-OWN combination forecast during recessions is well above any of the other R^2_{OS} statistics in the third through fifth columns of Table 5 and all of the R^2_{OS} statistics in Table 3. The relatively strong predictability of the U.S. equity premium using economic variables discussed in Section 3 is thus magnified during recessions.

[14]Using data for the G-7 countries and considering a small set of economic variables, Henkel, Martin, and Nadari (2008) recently provide evidence of greater in-sample return predictability during recessions.

[15]Complete results for individual predictive regression model forecasts during expansions and recessions are available upon request from the authors.

Countries such as Belgium, Canada, and Japan also exhibit fairly substantial increases in the R^2_{OS} statistics for the ECON-OWN combination forecasts during recessions compared to expansions; likewise, the ECON-USA combination forecast for Canada nearly triples from 0.55% during expansion to 1.42% during recessions (both statistics are significant at the 10% level).[16] Nevertheless, the R^2_{OS} statistics during recessions for these countries are still substantially less than the R^2_{OS} for the U.S. ECON-OWN combination forecast during recessions.

The second notable finding in Table 5 is the substantial R^2_{OS} statistics for individual forecasts based on lagged U.S. excess returns in the sixth column of Panel B. With the exceptions of the United Kingdom and United States, the R^2_{OS} statistics for the LRET-USA forecasts are all considerably higher during recessions than expansions. Apart from the United Kingdom and United Sates, the R^2_{OS} statistics for the LRET-USA forecasts during recessions are statistically significant at conventional levels (despite the reduced number of observations available during recessions) and clearly economically significant for all countries, ranging from 2.70% (France) to 7.99% (Canada). Table 5 indicates that the leading role for U.S. excess returns with respect to international return predictability—initially identified in Table 3—is especially evident during recessions, linking return predictability to business-cycle fluctuations.

In Section 4, we argued that the predictive ability of lagged U.S. returns with respect to non-U.S. returns is compatible with information frictions. The results in Table 5 indicate that the effects of these frictions and the leading role of the United States are principally manifested during downturns. Consider a significant adverse economic shock to the U.S. economy that represents rapidly deteriorating macroeconomic fundamentals and the onset of a recession in the United States. Given that many investors pay close attention to the U.S. economy, U.S. stock prices decline quickly and significantly as this information is promptly incorporated into U.S. share prices. Lower U.S. share prices can reflect both decreases in expected future cash flows and a higher risk premium. Since the U.S. economy is the world's largest economy with important links to many other countries, the negative U.S. shock also adversely affects economic conditions in other countries, potentially drawing these countries into recession as well.[17] With many investors focusing more intently on

[16]Combination forecasts for countries such as Germany, Italy, and the United Kingdom display a reverse patten in the third through fifth columns of Table 5, with higher R^2_{OS} statistics during expansions than recessions.

[17]Recessionary months are significantly correlated across the United States and the eleven other industrialized countries, ranging from 0.26 for Japan to 0.52 for Canada. The relatively low figure for Japan is not surprising, given the country-specific problems experienced by Japan resulting in the "lost decade." The relatively high figure for Canada makes sense, since the United States and Canada are adjacent countries with strong economic ties. We also found that lagged U.S. excess returns are significant out-of-sample predictors of industrial production growth in other countries, especially during recessions; the complete results are available upon request from the authors.

the United States and information-processing limitations, however, the spillover effects of the contractionary U.S. shock are incorporated more slowly into equity prices in other countries. Share prices in non-U.S. countries therefore initially underreact and still decline significantly in the future, so that U.S. returns exhibit relatively strong forecasting ability for non-U.S. stock returns during recessions.

If the United States plays a leading role, the out-of-sample predictability of lagged U.S. excess returns should be particulary evident during the recent global financial crisis, since the crisis originated primarily in the United States and has been characterized by rapid and substantial deteriorations in macroeconomic fundamentals worldwide. As a final exercise, we evaluate out-of-sample equity premium forecasts over the recent global crisis. Table 6 reports out-of-sample forecasting results for the 2007:01–2009:05 forecast evaluation period, which roughly covers the recent global crisis. All of the countries are in recession for a number of months during this period. As in Table 5, we report R^2_{OS} statistics for combination forecasts and individual predictive regression model forecasts based on lagged U.S. excess returns. The out-of-sample predictive ability of lagged U.S. excess returns is strikingly evident in the fifth column of Table 6. The R^2_{OS} statistics for the LRET-USA forecasts range from 6.71% for Sweden to 13.52% for Italy for the non-U.S. countries, and nine of the eleven non-U.S. R^2_{OS} statistics are greater than 10%. All of the non-U.S. R^2_{OS} statistics are significant at conventional levels, despite the fact that there are only 29 available monthly observations. The R^2_{OS} statistics for the LRET-USA forecasts in the sixth column are typically much higher than the R^2_{OS} statistics in the other columns of Table 6, highlighting the leading role played by the United States during the recent crisis.

6 Conclusion

This paper provides extensive out-of-sample evidence of economically significant stock return predictability across a host of industrialized countries. There are important differences, however, in the nature of equity premium predictability between the United States and other developed countries, pointing to a unique role for the United States. Economic variables display substantially more out-of-sample predictive ability in the United States than in other industrialized countries. The greater predictive power of economic variables for the U.S. equity premium is especially evident during recessions. Insofar as predictability results from rational time-varying expected returns related to business-cycle fluctuations, this suggests that the U.S. equity market is more efficient in pricing macroeconomic risk. Of course, there are other potential explanations, and explaining the greater forecasting ability of economic variables in the United States is an important topic for future research.

The United States is also unique in that U.S. returns lead returns in other countries. That is, lagged U.S. excess returns forecast excess returns in many non-U.S. countries, while the converse does not hold. The predictive ability of lagged U.S. returns is particularly evident during recessions and strikingly evident during the recent global financial crisis. Granger causality tests demonstrate that the predictive ability of lagged U.S. excess returns is not an artifact of return autocorrelation and contemporaneous correlation. Our finding that U.S. excess returns lead excess returns in other countries is reminiscent of the lead-lag relationships in portfolios of individual U.S. stocks sorted on size, analyst coverage, and volume (e.g., Lo and MacKinlay, 1990; Brennan, Jegadeesh, and Swaminathan, 1993; Chordia and Swaminathan, 2000) and shows that important lead-lag relationships also exist across countries.

Applying the basic idea of Hong, Torous, and Valkanov (2007) to our international context, we argue that the leading role of the United States is consistent with information frictions. More specifically, many investors focus more intently on the U.S. market. Combined with information-processing limitations, this creates a slow diffusion of relevant information on macroeconomic fundamentals across countries. An adverse shock to the U.S. economy, for example, is quickly and completely reflected in U.S. share prices, while it is only fully reflected in other countries' share prices with a lag, despite the worldwide economic implications of the U.S. shock. U.S. excess returns thus lead non-U.S. excess returns. Exploring whether there are plausible explanations for the leading role of the United States based on rational time-varying risk premiums remains an open question.

Data Appendix

[To be added]

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Table 1
Summary statistics, monthly country excess stock returns (percent), 1956:02–2009:05

(1) Country	(2) Mean	(3) Standard deviation	(4) Minimum	(5) Maximum	(6) Sharpe ratio	(7) Autocorrelation
AUS	0.52	4.96	−43.05	18.40	0.11	0.09
BEL	0.22	4.45	−31.76	23.53	0.05	0.15
CAN	0.32	4.54	−23.30	15.95	0.07	0.12
FRA	0.40	5.48	−22.48	22.27	0.07	0.15
DEU	0.40	5.08	−24.09	19.84	0.08	0.15
ITA	0.21	6.48	−20.66	28.78	0.03	0.10
JPN	0.50	5.33	−26.67	27.45	0.09	0.06
NLD	0.49	5.07	−22.74	21.99	0.10	0.10
SWE	0.67	5.67	−22.61	33.89	0.12	0.13
CHE	0.62	4.84	−24.64	22.58	0.13	0.11
GBR	0.48	5.46	−27.33	53.16	0.09	0.12
USA	0.41	4.27	−22.09	16.30	0.10	0.06

Table 2
R^2_{OS} statistics (percent), individual predictive regression model and combination forecasts for country excess stock returns based on economic variables, 1966:01–2009:05 forecast evaluation period

(1) Predictor	(2) AUS	(3) BEL	(4) CAN	(5) FRA	(6) DEU	(7) ITA	(8) JPN	(9) NLD	(10) SWE	(11) CHE	(12) GBR	(13) USA
DP-OWN	−0.88	−0.72	−1.26	−0.44	−0.35	−0.85	−0.30	−0.64	−0.64	−1.10	0.43**	−0.88
INFL-OWN	−0.78	0.50*	−0.40	−0.44	−0.17	−0.40	0.05	−0.08	−0.44	−0.23	−1.05	−0.42
dINFL-OWN	−0.91	−0.30	−0.26	−0.04	−0.30	0.05	0.14	−0.24	−0.36	−0.50	−0.19	−0.19
BILL-OWN	−1.42	−0.80	−0.75	−0.69	0.33**	−1.36	−0.38	−0.46	−0.82	−1.54	−1.99	−1.13
BOND-OWN	−1.96	−0.90	−0.80	−1.18	−0.36	−1.20	−1.15	−1.01	−0.74	−2.31	−3.20	−1.30
LTR-OWN	−1.88	1.79***	0.10*	0.47*	−0.21	−0.98	0.03	0.52	−0.03	−0.67	−0.61	1.05***
TERM-OWN	−0.64	−0.72	−0.25	−0.11	0.10*	−0.55	−0.70	−0.08	−0.33	−2.27	−1.54	−0.24
OIL-OWN	−1.73	−0.18	−0.88	−1.05	−0.49	0.42**	−1.45	−1.45	−1.23	−0.99	−0.39	−1.35
IPG-OWN	−0.96	−0.42	0.51*	−0.78	−0.41	−0.61	−0.09	−0.71	−0.64	−1.33	−1.17	−0.45
RXR-OWN	−1.76	−0.95	−0.21	−2.27	−1.07	−2.89	−0.55	−1.32	−0.63	−1.44	−5.07	−0.67
ECON-OWN	0.03	0.42*	0.38	0.09	0.71**	0.36	0.20	0.20	−0.03	−0.37	0.43	1.26*
DP-USA	−0.96	−0.86	−1.15	−1.14	−0.70	−0.87	−0.46	−0.81	−0.64	−1.14	−1.12	–
INFL-USA	−0.32	0.46*	−0.24	−0.27	0.28*	−0.12	0.37**	0.14	−0.44	−0.48	−0.66	–
dINFL-USA	0.12	−0.23	−0.17	0.19	0.44*	1.42***	0.52*	−0.03	−0.36	−0.06	−0.02	–
BILL-USA	−0.72	−0.70	−0.90	−0.82	−0.61	−0.96	−0.76	−0.94	−0.82	−1.52	−1.01	–
BOND-USA	−0.98	−0.73	−1.10	−0.93	−0.65	−1.16	−1.02	−1.00	−0.74	−0.95	−1.28	–
LTR-USA	0.28*	1.00**	1.00***	−0.38	0.05	−0.40	−1.74	0.12*	−0.03	0.22*	−0.95	–
TERM-USA	−0.71	−0.09	−0.80	−0.58	−0.97	−0.48	−0.53	−0.43	−0.33	−1.43	−0.21	–
IPG-USA	−0.24	−0.39	−0.28	−0.35	−0.15	0.10	0.33	−0.18	−0.64	−0.45	−1.22	–
ECON-USA	0.26	0.62**	0.73**	−0.18	0.42**	0.10	0.22	0.44*	−0.17	0.37	0.10	–
ECON-OWN-USA	0.21	0.56**	0.58**	0.00	0.62**	0.30	0.26*	0.35	−0.07	0.01	0.35	–

Notes: The table reports the Campbell and Thompson (2008) out-of-sample R^2 statistic, R^2_{OS} (percent), for individual predictive regression model and combination forecasts of excess stock returns for the country indicated in the column heading. The individual predictive regression model forecasts are generated recursively using data beginning in 1956:02 and are based on the predictor indicated in the row heading. DP, INFL, dINFL, BILL, BOND, LTR, TERM, OIL, IPG, and RXR are economic variables that serve as predictors; OWN refers to domestic economic variables for the country indicated in the column heading; USA refers to U.S. economic variables. The combination forecasts are formed from the individual predictive regression model forecasts; ECON-OWN, ECON-USA, and ECON-OWN/USA are combination forecasts based on the country's domestic economic variables, U.S. economic variables, and the country's domestic and U.S. economic variables taken together, respectively. Statistical significance for the R^2_{OS} statistic is based on the Clark and West (2007) *MSPE-adjusted* statistic corresponding to $H_0 : R^2_{OS} \leq 0$ against $H_1 : R^2_{OS} > 0$; *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Table 3
R^2_{OS} statistics (percent), individual predictive regression model and combination forecasts for country excess stock returns based on lagged stock returns, 1966:01–2009:05 forecast evaluation period

(1) Predictor	(2) AUS	(3) BEL	(4) CAN	(5) FRA	(6) DEU	(7) ITA	(8) JPN	(9) NLD	(10) SWE	(11) CHE	(12) GBR	(13) USA
LRET-AUS	0.06^{*}	-0.29	0.01	0.08^{*}	-1.05	0.29^{**}	1.29^{***}	0.63^{**}	-0.43	-0.24	-0.46	-0.48
LRET-BEL	0.62^{**}	1.93^{***}	-0.07	2.00^{***}	0.96^{**}	0.23	1.40^{**}	0.48	0.43^{*}	-0.67	-0.56	-0.92
LRET-CAN	1.09^{**}	0.92^{**}	0.86^{**}	0.16	1.80^{***}	0.38^{*}	1.98^{***}	0.78^{**}	1.60^{***}	0.66^{**}	-0.62	-0.43
LRET-FRA	2.05^{***}	0.99^{**}	-0.26	0.94^{***}	0.93^{**}	1.65^{***}	1.02^{**}	0.37	0.29	-0.44	0.27^{*}	-1.36
LRET-DEU	0.56^{**}	0.33	0.13	0.36	-1.22	0.26^{*}	0.06	-0.04	0.48^{*}	0.42^{*}	-0.14	-0.62
LRET-ITA	0.35^{*}	-0.01	0.02	0.19^{*}	-0.07	0.43^{*}	0.85^{**}	0.02	0.34	-0.27	-0.85	-0.32
LRET-JPN	0.07	0.12	0.42^{*}	0.60^{*}	0.77^{**}	-0.02	-0.09	1.00^{***}	0.39^{*}	-0.03	0.01	-0.41
LRET-NLD	1.58^{***}	1.90^{***}	0.68^{**}	1.32^{***}	0.63^{***}	0.10	0.63^{*}	0.45^{*}	0.81^{**}	0.57^{*}	0.02^{*}	-0.40
LRET-SWE	0.83^{**}	2.55^{***}	2.10^{***}	2.93^{***}	1.93^{***}	0.66^{***}	1.24^{**}	1.86^{***}	1.07^{**}	3.64^{***}	-0.31	0.19
LRET-CHE	1.51^{***}	2.35^{***}	0.40^{*}	1.42^{***}	2.77^{***}	1.51^{***}	0.21	1.49^{***}	0.90^{**}	0.82^{**}	0.70^{*}	-0.45
LRET-GBR	1.08^{**}	0.91^{***}	0.40^{*}	-0.28	0.43^{*}	0.60^{**}	2.53^{***}	0.75^{**}	0.70^{**}	0.82^{**}	0.49	-0.02
LRET-USA	1.88^{***}	2.96^{***}	1.60^{***}	1.39^{***}	3.07^{***}	1.74^{***}	2.09^{***}	1.87^{***}	2.32^{***}	2.33^{***}	-0.23	-0.40
LRET-ALL	1.97^{***}	2.10^{***}	0.93^{***}	2.16^{***}	2.89^{***}	1.31^{***}	1.84^{***}	1.26^{***}	1.15^{**}	1.63^{***}	0.50	-0.28
ALL	1.18^{***}	1.34^{***}	0.78^{***}	1.11^{***}	1.91^{***}	0.86^{***}	1.03^{***}	0.82^{***}	0.53^{**}	0.80^{**}	0.55	0.50^{**}

Notes: The table reports the Campbell and Thompson (2008) out-of-sample R^2 statistic, R^2_{OS} (percent), for individual predictive regression model and combination forecasts of excess stock returns for the country indicated in the column heading. The individual predictive regression model forecasts are generated recursively using data beginning in 1956:02 and are based on the predictor indicated in the row heading. LRET refers to lagged country stock returns. The combination forecasts are formed from the individual predictive regression model forecasts; LRET-ALL is a combination forecast based on all lagged country stock returns; ALL is a combination forecast based on the on the country's domestic economic variables, U.S. economic variables, and all lagged country stock returns taken together. Statistical significance for the R^2_{OS} statistic is based on the Clark and West (2007) *MSPE-adjusted* statistic corresponding to $H_0 : R^2_{OS} \leq 0$ against $H_1 : R^2_{OS} > 0$; *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Table 4
Granger causality test results, country excess returns

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
In-sample results, 1956:02–2009:05						Out-of-sample results, 1966:01–2009:05	
$r_{j,t}$ = USA			$r_{i,t}$ = USA			USA → non-USA	non-USA → USA
$r_{i,t}$	$\hat{b}_0$	$\hat{c}_0$	$r_{j,t}$	$\hat{b}_0$	$\hat{c}_0$	R^2_{OS}	R^2_{OS}
AUS	0.03	0.16***	AUS	0.03	0.02	1.08**	−0.55
BEL	0.07	0.16***	BEL	0.07	0.01	0.81***	−1.14
CAN	0.01	0.15**	CAN	0.01	0.00	0.11	−0.58
FRA	0.09*	0.14**	FRA	0.09*	−0.01	0.03	−1.45
DEU	0.07	0.20***	DEU	0.07	−0.02	1.72***	−0.65
ITA	0.06	0.18***	ITA	0.06	0.02	1.05***	−0.54
JPN	0.02	0.17***	JPN	0.02	0.02	1.68***	−0.40
NLD	−0.01	0.20***	NLD	−0.01	0.00	1.09***	−0.48
SWE	0.07	0.18***	SWE	0.07	0.06*	1.03**	−0.27
CHE	0.01	0.19***	CHE	0.01	−0.02	1.20***	−0.56
GBR	0.09	0.06	GBR	0.09	0.05	−1.03	−0.40

Notes: Columns (1)–(6) of the table report in-sample OLS coefficient estimates for the autoregressive (ARDL) model, $r_{i,t} = a + b_0 r_{i,t-1} + c_0 r_{j,t-1} + e_{i,t}$, where $r_{i,t}$ and $r_{j,t}$ are country excess stock returns. Statistical significance for the coefficients is based on heteroskedasticity-consistent t-statistics; *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively; 0.00 indicates < 0.005. Columns (7) and (8) report a modified version of the Campbell and Thompson (2008) out-of-sample R^2 statistic, R^2_{OS} (percent), for ARDL model forecasts relative to autoregressive (AR) model forecasts. The ARDL and AR model forecasts are generated recursively using data beginning in 1956:02. Column (7) reports results for the ARDL model with non-USA (USA) excess stock returns serving as $r_{i,t}$ ($r_{j,t}$); column (8) reports results for the ARDL model with USA (non-USA) excess stock returns serving as $r_{i,t}$ ($r_{j,t}$). Statistical significance for the R^2_{OS} statistic is based on the Clark and West (2007) *MSPE-adjusted* statistic corresponding to $H_0 : R^2_{OS} \leq 0$ against $H_1 : R^2_{OS} > 0$; *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Table 5
R^2_{OS} statistics (percent) during classical business-cycle expansions and recessions, country excess stock return forecasts, 1966:01–2009:05 forecast evaluation period

(1) Country	(2) Observations	(3) ECON-OWN	(4) ECON-USA	(5) ECON-OWN/USA	(6) LRET-USA	(7) LRET-ALL	(8) ALL
A. Expansions							
AUS	442 (85%)	0.23	0.41	0.39	1.23***	1.12***	0.91***
BEL	427 (82%)	0.24	0.56**	0.43**	1.26***	1.42***	0.98***
CAN	461 (88%)	0.19	0.55*	0.40	0.00	0.23	0.40*
FRA	426 (82%)	0.35	0.00	0.23	0.93**	2.07***	1.19***
DEU	368 (71%)	0.87**	0.50**	0.75**	1.72**	2.67***	1.87***
ITA	422 (81%)	0.50*	0.20	0.43*	0.36*	0.63*	0.67**
JPN	409 (79%)	0.04*	0.17	0.16	0.24	0.75*	0.51*
NLD	392 (75%)	0.48	0.75**	0.63**	0.03	0.29	0.59**
SWE	390 (75%)	−0.31	−0.13	−0.20	1.74**	0.71*	0.29
CHE	385 (74%)	0.00	0.57*	0.32	1.08**	0.98**	0.72***
GBR	453 (87%)	1.46***	1.23**	1.45***	1.23**	0.35	1.17***
USA	439 (84%)	0.53*	–	–	−0.34	−0.47	0.06
Average	418 (80%)	0.38	0.44	0.45	0.79	0.90	0.78
B. Recessions							
AUS	79 (15%)	−0.73	−0.32	−0.48	4.41**	5.31**	2.23
BEL	94 (18%)	0.93*	0.76	0.89	7.64***	3.96**	2.34**
CAN	60 (12%)	1.12	1.42*	1.29*	7.99***	3.69***	2.33***
FRA	95 (18%)	−0.65	−0.70	−0.66	2.70*	2.41*	0.88
DEU	153 (29%)	0.45	0.27	0.42	5.30***	3.24**	1.98***
ITA	99 (19%)	0.07	−0.12	0.03	4.67***	2.75***	1.27**
JPN	112 (21%)	0.57*	0.33	0.51	6.33***	4.31***	2.22***
NLD	129 (25%)	−0.37	−0.21	−0.27	5.78***	3.32***	1.31*
SWE	131 (25%)	0.42	−0.25	0.14	3.23**	1.85**	0.90**
CHE	136 (26%)	−1.12	−0.03	−0.60	4.83***	2.94***	0.97
GBR	68 (13%)	−1.49	−2.02	−1.69	−2.97	0.78	−0.60
USA	82 (16%)	2.79***	–	–	−0.69	0.11	1.42**
Average	103 (20%)	0.16	−0.08	−0.04	4.10	2.89	1.44

Notes: The table reports the Campbell and Thompson (2008) out-of-sample R^2 statistic, R^2_{OS} (percent), for individual predictive regression model and combination forecasts of excess stock returns for the country indicated in the row heading. The R^2_{OS} statistic is computed separately over classical business-cycle expansions (Panel A) and recessions (Panel B). "Observations" is the number of months where the country is in an expansion or recession. Parentheses report the percentage of observations in an expansion or recession. The individual predictive regression model forecasts are generated recursively using data beginning in 1956:02. LRET-USA refers to the individual predictive regression model with lagged U.S. stock returns. The combination forecasts are formed from individual predictive regression model forecasts; ECON-OWN, ECON-USA, ECON-OWN/USA, and LRET-ALL are combination forecasts based on the country's domestic economic variables, U.S. economic variables, the country's domestic and U.S. economic variables taken together, and all lagged country stock returns, respectively; ALL is a combination forecast based on the country's domestic economic variables, U.S. economic variables, and all lagged country stock returns taken together. "Average" corresponds to the average across the 12 countries. Statistical significance for the R^2_{OS} statistic is based on the Clark and West (2007) *MSPE-adjusted* statistic corresponding to $H_0: R^2_{OS} \leq 0$ against $H_1: R^2_{OS} > 0$; *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Table 6
R^2_{OS} statistics (percent) during recent crisis, country excess stock return forecasts, 2007:01–2009:05 forecast evaluation period

(1) Country	(2) ECON-OWN	(3) ECON-USA	(4) ECON-ALL	(5) LRET-USA	(6) LRET-ALL	(7) ALL
AUS	−0.54	−2.24	−1.27	10.87**	7.33*	2.55*
BEL	0.68	−0.50	0.16	11.39**	6.34**	2.81**
CAN	−0.11	−1.75	−0.82	11.01**	6.01**	2.05*
FRA	−0.47	−0.70	−0.56	13.34***	9.25***	3.67**
DEU	−0.22	−0.77	−0.45	12.17**	7.29**	2.96**
ITA	−0.03	−0.14	−0.05	13.52***	7.46***	3.16**
JPN	0.06	−0.32	−0.08	10.55***	7.03**	2.99**
NLD	0.69*	−0.21	0.30	10.32***	5.57**	2.55**
SWE	−1.29	−0.08	−0.75	6.71*	3.94*	1.35
CHE	−1.62	−2.30	−1.90	13.33**	6.81**	1.89*
GBR	1.30	−0.80	0.39	6.85**	3.85*	1.99**
USA	−1.79	–	–	0.22	1.51*	0.06
Average	−0.28	−0.89	−0.46	10.02	6.03	2.34

Notes: The table reports the Campbell and Thompson (2008) out-of-sample R^2 statistic, R^2_{OS} (percent), for forecasts of excess stock returns for the country indicated in the row heading. The individual predictive regression model forecasts are generated recursively using data beginning in 1956:02. LRET-USA refers to the individual predictive regression model with lagged U.S. stock returns. The combination forecasts are formed from individual predictive regression model forecasts; ECON-OWN, ECON-USA, ECON-OWN/USA, and LRET-ALL are combination forecasts based on the country's domestic economic variables, U.S. economic variables, the country's domestic and U.S. economic variables taken together, and all lagged country stock returns, respectively; ALL is a combination forecast based on the country's domestic economic variables, U.S. economic variables, and all lagged country stock returns taken together. "Average" corresponds to the average across the 12 countries. Statistical significance for the R^2_{OS} statistic is based on the Clark and West (2007) *MSPE-adjusted* statistic corresponding to $H_0 : R^2_{OS} \leq 0$ against $H_1 : R^2_{OS} > 0$; *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.