CENTRE FOR BUSINESS AND ECONOMICS RESEARCH
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Predictability of stock returns and dividend growth using dividend yields: An international approach

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CeBER Working Papers

No. 10 2018

Predictability of stock returns and dividend growth using dividend yields: An international approach.

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November 12, 2018

Abstract

This paper examines stock returns and dividend growth predictability using dividend yields in seven large developed markets: US, UK, Japan, France, Germany, Italy and Spain. Altogether, these countries account for around 85% of the MSCI World Index. We use annual data, and for the US, UK, Japan, and France the time series are long enough to conduct a separate analysis of the pre- and post-IIWW periods. We also study the relationship between the predictability in dividend growth and the degree of dividend smoothness. For the post-IIWW period, returns are predictable in the US and the UK but dividends are unpredictable, while the opposite pattern is observed in Spain and Italy. In Germany, there is some evidence of short-term predictability for both returns and dividends, while in France only returns are predictable. In Japan, neither variable can be forecasted. Generally, there is no clear connection between dividend smoothness and predictability.

Keywords: Return; Dividend Yield, Dividend Growth, Dividend Smoothing, Predictability.
JEL codes: G12, G17.

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1. Introduction

The relationship between dividend yield and returns and dividend growth is a central issue to understand the functioning of capital markets, and has considerable implications for capital asset pricing and portfolio investment strategies. This research topic is not new, but still, there are no consensual general findings, and the discussion on if the main results obtained for the US are applicable to other countries remains quite actual.

For the US, the mainstream of the literature found that the dividend yield has some predictive power on returns but the predictive power decreases substantially when the dividend growth is the explained variable. A possible explanation proposed in the literature is the dividend smoothing practices undertaken by firms.

This paper contributes to the existing literature by providing additional international evidence on the predictive power of the dividend yield on returns and dividend growth. More precisely, the paper analysis these relationships for the US, UK, Japan, France, Germany, Italy, and Spain, using up-to-date data. Notice that the aim of the paper is not to construct significant and robust forecasts of returns and dividend growth, which, arguably would be better achieved by including other economic and financial variables as regressors, than just only the dividend yield. Therefore, this paper is in line with Cochrane (2008), who constructs a joint test for the return and dividend growth predictability, using just the dividend yield as the regressor. Additionally, we also try to figure out if there is some pattern relating dividend smoothness measures and dividend growth predictability, as in Chen et al (2012).

The remaining of this study is structured into five sections. Section 2 shows a brief literature review on the topic of dividend yield predictive power. Section 3 presents the data and provides some descriptive statistics. Section 4 outlines the basic theoretical concepts and presents the specifications of the models. Section 5 shows the results for the relationship between returns and dividend growth and dividend yield. This section also provides some insights on dividend smoothing. Section 6 concludes de paper.

2. Literature Review

Throughout the last decades, many authors have studied the predictability of returns and dividend growth by the dividend yield (see, for instance, Ferson and Harvey, 1991, Campbell and Ammer, 1993, Cochrane, 2001, 2008, and Lettau and Ludvigson, 2005). The main finding was that the dividend yield strongly predicts stock returns but it does not predict dividend growth rates. However, this result has been increasingly contested by other papers, showing that dividend yields also predict dividend growth. Campbell and Shiller (1988) report that in the US, the dividend-price ratio significantly forecasted one-year dividend growth until 1986. Ang (2002) reach the same conclusion using data until 2000, however, he also found that for horizons beyond one year there is no significant dividend growth predictability by the dividend-price ratio. A more recent study by Chen (2009) presents some evidence that the dividend yield did, in fact, predict aggregate US dividend growth in the period before the Second World War (IIWW) but this predictive power vanishes in the post-war period. Finally, Binsbergen et al. (2010), using the present-value model framework, show that U.S. dividends are predictable by the whole history of dividend yields.

Most studies on return predictability by the dividend yield (or dividend-price ratio) use US data, this emphasis on the US is even more pronounced when it comes to examining dividend growth predictability (see Paye and Timmermann, 2006). However, there are some studies focusing on other countries. Campbell (2003) conduct a comprehensive study on asset price determination within a consumption-based framework using international data. He found some evidence on the dividend growth predictability by the dividend–price ratio in several countries (but not in the US). Engsted and Pedersen (2010) study the dividend yield power in predicting Scandinavian dividend growth. They show that the predictability depends on whether real or nominal variables are used in the analysis.

The ability of the dividend yield to predict dividend growth raises the following questions: what are the factors that influence that predictability? Is this ability a norm or an exception across economies? For instance, Lettau and Ludvigson (2005) provide a potential justification for the absence of predictability of the dividend growth by the dividend-price ratio in the period after the II WW. They conclude that the forecasts of dividends and the changeable forecasts of the excess stock returns are positively correlated with the business cycles. The variations, both in expected returns and in expected dividend growth are compensated on the dividend–price ratio. They also provide an explanation for the consumption–wealth ratio having a higher power than the log dividend–price ratio in predicting the excess stock market returns over medium-term horizons. Chiang (2008) shows that when the dividends do not capture the relevant future cash-flows, the expected dividend growth is not predictable by the dividend yields. They argue that this is due to the flatness of the dividend series, which in turn results from the manipulation and shifts in the financial policies of firms.

In this line of reasoning, a possible explication for the absence of dividend predictability has to do with the way companies define their dividend policy and more specifically to the practice of dividend smoothing. Chen et al. (2012) report that dividend smoothing can destroy dividend predictability in a finite sample. In fact, there is a noticeable difference in firms' dividend policies in the US before and after the IIWW, with the dividend payouts being much smoother in the post-war period. Thus, linking this trajectory of the dividends with the fact that dividend smoothing diminishes their predictability justifies why dividend growth is predictable before the IIWW but not after.

Dividend smoothing literature is heavily weighted towards the US and the international evidence on the relationship between the dividend unpredictability and dividend smoothing is scarce. Usually, authors study separately the two issues and if there is evidence on dividend unpredictability and dividend smoothing for a particular country, they conclude that probably there is a causal relationship from the later to the former. Rangvid et al. (2014) provide a reference study on this relationship, showing that dividend predictability is weaker in large and developed markets where dividends are smoothed more, the typical firm is large, and volatility is lower, hence concluding that the apparent lack of dividend predictability in the US does not uniformly extend to other countries. Our study provides additional evidence on the dividend yield predictability power and its relationship with dividend smoothing for seven of the most developed economies in the world.

3 Data Description

This paper examines the predictability of dividend growth and stock returns in the US, the UK, Japan, France, Germany, Italy, and Spain using the time series of annual stock prices, dividends and earnings since its availability until 2016. Annual data is used instead of monthly or quarterly data because at these finer frequencies the dividend measurement errors are more severe.

For these countries, we collected from the Global Financial Data database the time series of the "Total Stock Returns Index", denoted by RI_t, "Stock Prices Index", P_t, "Stocks - Dividend Yields", DY_t (in percentage), "Stocks - Earnings Yields", $(E/P)_t$, and "Consumer Prices Index", CPI_t, (the subscript refers to the end of the year *t*). The data is obtained at the aggregated level of each country general stock index provided by Global Financial Data. The sampling period is different for each country, and for some countries the "Stocks - Earnings Yields" are only available several years after all the other series. Figure 1 shows the sample periods of all the series for each country.

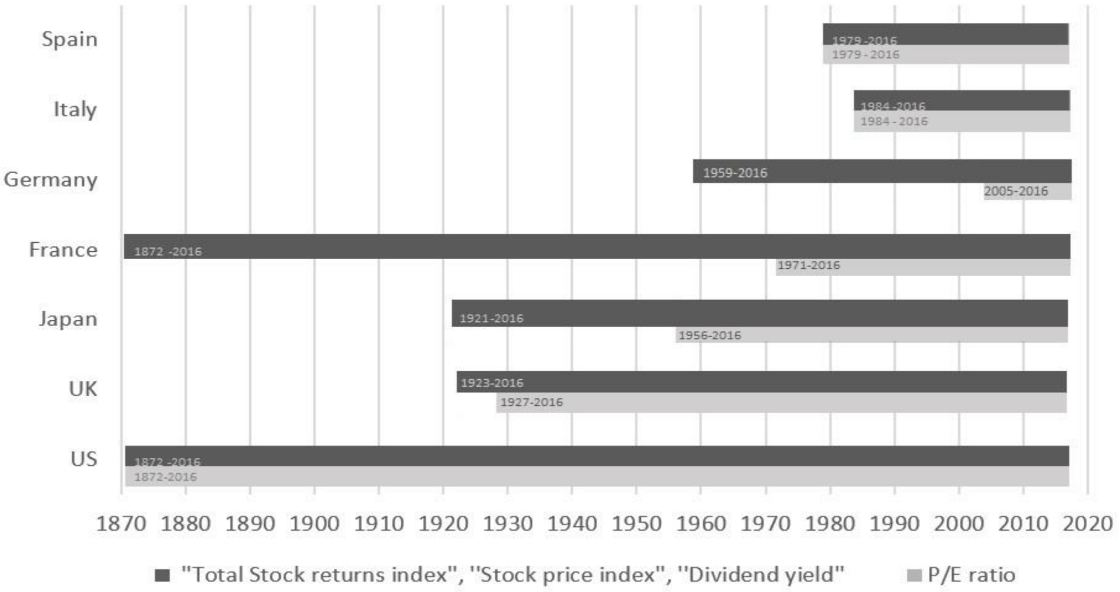

Figure 1: Sample period for each country.

The raw data was then used to compute the appropriate series. The dividend series are obtained as $D_t = (DY_t/100)P_t$, hence the yearly dividend growth is given by $DG_t = (D_t/D_{t-1}) - 1$. The price-earnings ratios are obtained by simply inverting the Earning Yields series, $(P/E)_t = ((E/P)_t)^{-1}$ and the earnings series are computed as $E_t = (E/P)_t \times P_t$. The arithmetic returns are given by $R_t = (RI_t/RI_{t-1}) - 1$. All the nominal variables, including the dividend growth and returns, were then deflated by the national *CPI* indices, in order to obtain their real values. The descriptive statistics of the real arithmetic return, real dividend growth and dividend yield for each country are shown in Table 1. For those countries (US, UK, Japan and France) where there is data prior to the IIWW, the overall sample is divided into two segments: the pre-IIWW period, from the start of the samples until 1945, and the post-war period, from 1946-2016.

For the overall sample, considering the US, UK Japan, and France, the mean annual return ranges from 5.7% for France to 8.9% for Japan, while the mean dividend growth, always lower than the mean return in the respective country, ranges from 0.9% for Japan to 3.8% for France. For these countries, the mean return and the mean dividend growth show an increasing pattern from the pre- to the post-IIWW period, while their standard-deviations do not show a clear pattern. For the dividend yield, the mean values have decreased while the standard deviations have increased from the first sub-sample to the second sub-sample. The first-order autocorrelation coefficient of returns became negative in the period after the IIWW, except for Japan, while this coefficient for the dividend growth has increased in the post-IIWW period. The statistics of Germany, Italy and Spain report to sampling periods after the IIWW and hence are better comparable with the post-IIWW subsample of the other four countries. The most out of line statistic is the negative correlation coefficient of dividend growth for Italy. The coefficient $\varphi(1)$ shows that the dividend yield is highly persistent, independently of the country or sampling period, ranging from 0.5 (US, pre-IIWW period) to 0.90 (Japan, overall sample).

Table 1: Descriptive statistics

	Overall sample			**Start of sample to 1945**			**1946-2016**		
Variable	**Mean**	σ	$\varphi(1)$	**Mean**	σ	$\varphi(1)$	**Mean**	σ	$\varphi(1)$
US									
R_t	0.080	0.189	0.006	0.078	0.203	0.017	0.087	0.175	-0.041
DG_t	0.020	0.114	0.302	0.014	0.144	0.213	0.026	0.069	0.372
DY_t	0.042	0.016	0.790	0.050	0.013	0.500	0.034	0.014	0.880
UK									
R_t	0.079	0.204	-0.107	0.069	0.143	0.298	0.083	0.218	-0.171
DG_t	0.012	0.080	0.368	0.001	0.107	0.364	0.013	0.070	0.395
DY_t	0.045	0.014	0.582	0.046	0.009	0.619	0.046	0.015	0.567
Japan									
R_t	0.089	0.302	0.213	0.052	0.244	0.122	0.085	0.326	0.233
DG_t	0.009	0.211	0.259	-0.045	0.162	0.185	0.015	0.233	0.267
DY_t	0.039	0.029	0.907	0.064	0.013	0.764	0.032	0.028	0.899
France									
R_t	0.057	0.254	0.074	0.039	0.264	0.174	0.064	0.249	-0.070
DG_t	0.038	0.364	0.185	-0.019	0.355	-0.079	0.085	0.370	0.101
DY_t	0.038	0.013	0.764	0.039	0.010	0.774	0.037	0.016	0.786
Germany									
R_t	0.070	0.227	-0.077	-	-	-	-	-	-
DG_t	0.033	0.134	0.244	-	-	-	-	-	-
DY_t	0.033	0.010	0.683	-	-	-	-	-	-
Italy									
R_t	0.069	0.260	0.112	-	-	-	-	-	-
DG_t	0.040	0.220	0.169	-	-	-	-	-	-
DY_t	0.031	0.013	0.625	-	-	-	-	-	-
Spain									
R_t	0.109	0.256	0.165	-	-	-	-	-	-
DG_t	0.032	0.218	-0.178	-	-	-	-	-	-
DY_t	0.051	0.034	0.808	-	-	-	-	-	-

R_t denotes the arithmetic real returns, and DG_t and DY_t denote the real dividend growth and the dividend yield, respectively. σ refers to the standard deviation and $\varphi(1)$ is the first-order autocorrelation coefficient. For those countries where the sample period begins before the IIWW, the overall sample is partitioned into pre- and post- IIWW subsamples.

4. Models specifications

This section introduces the theoretical concepts and models that are central to the examination of the power of dividend yield in predicting stock returns and dividend growth in different time horizons. Additionally, it presents the concept of dividend smoothing and the models of dividend policy estimated in the next section.

4.1 The dividend yield model for returns and dividend growth

Following Campbell and Shiller (1988), one can derive the following one-period log-linear return approximation:

$$r_{t+1} = \Delta d_{t+1} + (d_t - p_t) - \rho(d_{t+1} - p_{t+1}) + c, \tag{1}$$

where r_{t+1}, d_{t+1}, and p_{t+1} denote the log-return, the log-dividend and log-price of a given stock at period $t+1$, respectively. Hence, Δd_{t+1} is the logarithmic dividend growth rate, and

$$\rho = 1/\left(1 + e^{E[d - p]}\right), \tag{2}$$

where $E[d-p]$ is the expected logarithmic dividend yield that can be simply estimated by the average of the historical logarithmic dividend yield. So ρ is time-independent and is typically close to unity. c is a linearization constant.

The present value relationship can be obtained by solving Equation (1) forward, taking conditional expectations and imposing a no-bubble condition in the dividend yield, i.e. $\lim_{j\to\infty} \rho^j\left(d_{t+j} - p_{t+j}\right) = 0$. Accordingly,

$$d_t - p_t = E_t\textstyle\sum_{j=0}^{\infty} \rho^j\left(r_{t+j+1} - \Delta d_{t+j+1}\right) - c/(1 - \rho)\,. \tag{3}$$

This equation indicates that the current dividend yield can be seen as the discounted value of all future returns r_{t+j+1} and future dividend growth rates Δd_{t+j+1}, both discounted at a constant rate ρ (minus a constant $c/(1 - \rho)$). Equation (3) implies that the dividend yield predicts future returns and/or future dividend growth.

To examine the predictability of returns and dividend growth by the dividend yield we use the first-order VAR representation of the returns, dividend growth and dividend yields, as proposed by Cochrane (2008):

$$r_{t+1} = a_r + b_r(d_t - p_t) + \varepsilon^r_{t+1}, \tag{4}$$

$$\Delta d_{t+1} = a_d + b_d(d_t - p_t) + \varepsilon^d_{t+1}\,, \tag{5}$$

$$d_{t+1} - p_{t+1} = a_{dp} + \varphi(d_t - p_t) + \varepsilon^{dp}_{t+1}. \tag{6}$$

The predictability of returns and dividend growth can be assessed by standard marginal tests. However, Cochrane (2008) highlights that the identity in Equation (1) applies to each data point, thus connecting the regression coefficients and the errors in the VAR system (4)-(6). Thus, the projection of Equation (1) on $d_t - p_t$ imply that the regression coefficients must obey to the approximate identity

$$b_r = 1 - \rho\varphi + b_d, \tag{7}$$

and the errors in the VAR are linked via $\varepsilon^r_{t+1} = \varepsilon^d_{t+1} - \varepsilon^{dp}_{t+1}$.

Assuming that the dividend yield process is not explosive, $\varphi \leq 1/\rho$, a null hypothesis with both unpredictable returns and unpredictable dividend growth is impossible. In other words, assuming no bubbles, if the dividend yield does not predict the future stock returns (future dividend growth) then it must predict future dividend growth (future stock returns). Hence, under the null hypothesis of no return predictability, $b_r = 0$, the dividend growth must be predictable, that is b_d must be negative (Null I). Conversely, if the dividend yield does not predict the future dividend growth, $b_d = 0$, then it must predict future returns, that is b_r must be positive (Null II).

4.2 Dividend Smoothing

Some authors argue that a possible explanation for the unpredictability of the dividend growth is the guidelines used by companies, aiming to smooth the dividends paid to shareholders, that is, the firms tend to determine the dividend payout taking into account current earnings and past dividend payouts, hence flattening the dividend time series.

The most used dividend smoothness measure is given by

$$S = \sigma(\Delta d)/\sigma(\Delta e), \tag{8}$$

where $\sigma(\Delta d)$ is the standard deviation of dividend growth and $\sigma(\Delta e)$ is the standard deviation of earnings growth. A higher value of *S* means that the dividend smoothness is lower.

In order to investigate the presence of dividend smoothing in our sample, we apply the same framework as Chen et al. (2012), built upon the three partial-adjustment models for the dividend behaviour proposed by Lintner (1956) and a fourth model proposed by Marsh and Merton (1987). The Lintner's models show the speed of adjustment of the dividend payout to a shock in the firm's earnings. The first model is the following

$$\text{Lintner 1: } \Delta D_t = \alpha_0 + \alpha_1 E_t + \alpha_2 D_{t-1} + u_t, \tag{9}$$

where ΔD_t is the change in the level of dividends, E_t is the level of earnings and D_{t-1} is the lagged dividend payout. In this model $-\alpha_2$ is the so-called Speed of Adjustment (SA) parameter. A positive shock in the firm's earnings results in an additional dividend payout.

The second model is the following:

$$\text{Lintner 2: } \Delta D_t = \beta_0 + \beta_1 \Delta E_t + \beta_2 \Delta D_{t-1} + u_t, \quad (10)$$

where ΔE_t is the change in the level of earnings and ΔD_{t-1} is the change in the dividend payout lagged one period. In this model $1 - \beta_2$ is the speed of adjustment, thus β_2 can be interpreted as a measure of dividend smoothness.

Lintner (1956) proposes a third model, as following:

$$\text{Lintner 3: } \Delta D_t = \gamma_0 + \gamma_1 E_t + \gamma_2 \Delta D_{t-1} + u_t, \quad (11)$$

In this model, γ_2 can be interpreted as the dividend smoothness metric. A higher value γ_2 mean a smoother dividend payout.

The fourth model, proposed by Marsh and Merton (1987), is the following:

$$\text{Marsh} - \text{Merton: } ln\left(\frac{D_{t+1}}{D_t}\right) + \left(\frac{D_{t+1}}{P_{t-1}}\right) = \lambda_0 + \lambda_1 ln\left(\frac{P_t + D_t}{P_{t-1}}\right) + \lambda_2 ln\left(\frac{D_t}{P_{t-1}}\right) + u_{t+1}, \quad (12)$$

where D_{t+1} is the next period dividend and P_t is the price at t. This model allows to capture the intensity of the dividend response to permanent earning changes. Here λ_1 can be interpreted as the dividend smoothness metric, such that a higher λ_1 corresponds to less dividend smoothing.

5. Empirical results

This section presents the estimation results of the models presented before. The VAR systems are estimated by OLS. Notice however that the VAR errors should be serially uncorrelated but may present significant cross-correlations, hence the OLS estimators of b_r, b_d, and φ, are consistent but biased in small samples. Accordingly, in this framework, hypotheses testing should be conducted using computing intensive methods, such as bootstrap resampling or Monte Carlo simulation. Table 2 presents the results from the VAR(1), Equations (4)-(6), for overall samples of the seven countries under scrutiny using real variables (deflated by the inflation rate).

Table 2: VAR parameter estimates and null hypotheses for the overall samples

								Corr. of Residuals				
	$\hat{\rho}$	**Variable**	$\hat{b}_r, \hat{b}_d, \hat{\varphi}$	**σ**	***Pm***	***Pc***	R^2	r	Δd	$d-p$	$\tilde{b}_d$	$\tilde{b}_r$
US	0.963	r	0.057	0.035	0.178	0.002	0.017	0.18	0.21	-0.83		0.146
		Δd	-0.088	0.027	0.000	0.000	0.102		0.11	0.37	-0.146	
		$d-p$	0.887	0.040	-	-	0.783			0.20		
UK	0.958	r	0.233	0.082	0.011	0.000	0.095	0.19	0.26	-0.92		0.070
		Δd	-0.068	0.030	0.143	0.126	0.056		0.08	0.15	-0.070	
		$d-p$	0.734	0.092	-	-	0.536			0.19		
JP	0.973	r	0.041	0.031	0.435	0.133	0.013	0.32	0.73	-0.58		0.067
		Δd	-0.024	0.031	0.093	0.003	0.008		0.25	0.10	-0.067	
		$d-p$	0.959	0.031	-	-	0.947			0.23		
FR	0.965	r	0.165	0.046	0.007	0.000	0.002	0.46	-0.03	-0.34		0.191
		Δd	0.070	7.000	0.346	0.335	0.000		0.30	0.51	-0.191	
		$d-p$	0.837	0.060	-	-	0.714			0.22		
GE	0.969	r	0.122	0.084	0.218	0.006	0.030	0.22	0.29	-0.86		0.322
		Δd	-0.193	0.041	0.000	0.000	0.191		0.13	0.21	-0.322	
		$d-p$	0.698	0.094	-	-	0.498			0.22		
IT	0.972	r	-0.016	0.100	0.573	0.309	0.001	0.26	0.23	-0.81		0.316
		Δd	-0.308	0.078	0.000	0.000	0.354		0.17	0.38	-0.316	
		$d-p$	0.704	0.105	-	-	0.490			0.29		
SP	0.958	r	0.057	0.057	0.309	0.031	0.000	0.23	-0.58	-0.86		0.183
		Δd	-0.128	0.066	0.003	0.000	0.001		0.22	0.79	-0.183	
		$d-p$	0.853	0.066	-	-	0.008			0.26		

For each country, the VAR(1) - Equations (4)-(6) – is estimated using real returns and dividend growth for the overall sample (see Table 1 on the sample periods for each country). $\hat{\rho}$ is computed according to Equation (2). σ is the heteroscedasticity-consistent standard errors of the coefficients (White, 1980). The column "Corr. of Residuals" refers to the matrix, where the elements in the diagonal are the standard deviations and the elements off-diagonal are the cross-correlations of residuals. *Pm* and *Pc* are probabilities obtained by the Monte Carlo simulations of the system given by Equations (4)-(6), considering $\varphi = \hat{\varphi}$, as in Cochrane (2008). These probabilities were obtained from 10000 simulations of the joint distribution of $\{ b_r, b_d \}$. For the returns rows, *Pm* is given by $prob\left(b_r > \hat{b}_r | b_r = 0\right)$ and *Pc* is given by $prob\left(b_r > \hat{b}_r, b_d > \hat{b}_d | b_r = 0\right)$. For the dividend-growth rows *Pm* is given by $prob\left(b_d < \hat{b}_d | b_d = 0\right)$ and *Pc* is given by $prob\left(b_d < \hat{b}_d, b_r < \hat{b}_r | b_d = 0\right)$. The last columns, $\tilde{b}_r$ and $\tilde{b}_d$, are the values of the parameters implied by the identity $b_r = 1 - \hat{\rho}\hat{\varphi} + b_d$, where $\hat{\varphi}$ is the sample estimate and $\hat{\rho}$ is value in the second column under the Null I, such that $b_r = 0$, and under the Null II, such that $b_d = 0$, respectively. Hence, $\tilde{b}_r = -\tilde{b}_d$, are the point estimates under the corresponding null hypotheses.

As expected, the constant discount factor, ρ, is close to unity, ranging from 0.958 for UK and Spain to 0.973 for Japan. The coefficient φ for the dividend yield equation is quite high but below unity, ranging from 0.698 for Germany to 0.959 for Japan, showing a higher degree of persistence in the dividend yield process. All the estimates of φ are significant at the 1% level and the dividend yield equation have the highest R^2 for all countries. In absolute terms, these coefficients of determination are high, except for Spain, where $R^2 = 0.008$. The coefficients for the returns and dividend growth equations, i.e. $\hat{b}_r$ and $\hat{b}_d$, have the expected signs, except for France, where $\hat{b}_d > 0$, and Italy, where $\hat{b}_r < 0$. The proportion of the variability of the one-period-ahead dividend grow explained by the dividend yield is only marginally lower than the corresponding proportion for the one-period-ahead return for the UK, Japan, and France. So there is evidence that the dividend growth is more predictable by the dividend yield than returns only for the US, Germany, and Italy.

The column labelled Pm in the table exhibits the p-values corresponding to the null hypothesis of no return predictability and no dividend growth predictability, based on a single parameter, whereas Pc presents the results from the Cochrane (2008) joint test. The traditional test, Pm, reveals that returns are only predictable in the UK and France, which corroborates the findings in Cochrane (2008) that this test lacks power to detect return predictability. The joint test is able to reject the null hypothesis of no predictability, at the 5% significance level, for all the countries except Japan and Italy. Regarding the dividend growth, the single parameter test rejects the null hypothesis for the US, Germany, Italy, and Spain. According to the joint test, this hypothesis is rejected for an additional country, Japan.

The columns 8 to 10, labelled Corr. of Residuals, present the standard deviation of the residuals on the diagonal, and the cross-correlations off the diagonal. The return standard deviations range from 0.18, for the US, to 0.46, for France. The unusually high return standard deviation for France may be explained by the turbulent period during the IIWW. The residuals of the dividend growth equation show a similar pattern: they are higher for France and Japan than for the remaining countries. The errors for the return and dividend yield equations are negatively correlated for all the countries, but the absolute value of the correlations for Japan and France is considerably lower than the ones for the remaining countries. This is important because the negative correlation between these errors generates a negative correlation between the estimates b_r and φ, which increases the power of the joint test relative to the marginal one-sided test. The return and dividend growth errors are positively correlated for all the countries except France and Spain. This phenomenon and the unexpected coefficient in the dividend growth equation can be seen as “red flags” for the case of France.

The lack of return and dividend growth predictability may be attributable to dividend smoothing practices and stock repurchases, as has been pointed out by Cochrane (2008), among others. That is, if prices move today in response to dividend news several years into the future, then this information would not be captured by the 1-year VAR presented in Equations (4)-(6), because this news would not be reflected in next year’s dividend. In order to address this issue, we tested if the long-horizon returns and dividend growth rates can be forecasted based on the dividend yield. These results are presented in Table 3 and Table 4, respectively. These tables also present the results for the two sub-samples, i.e. pre- and post-IIWW.

Table 3: Multi-period regressions for the returns

		Overall sample			**Pre-IIWW**			**Post-IIWW**		
	k	$\widehat{b}_{r,k}$	P_c	R^2	$\widehat{b}_{r,k}$	P_c	R^2	$\widehat{b}_{r,k}$	P_c	R^2
US	**1**	0.057	0.002	0.016	0.081	0.050	0.011	0.100	0.000	0.078
	5	0.267	0.000	0.066	0.543	0.009	0.132	0.393	0.000	0.262
	10	0.458	0.000	0.142	0.622	0.020	0.199	0.737	0.005	0.467
	15	0.642	0.004	0.216	0.808	0.046	0.266	0.971	0.015	0.582
	20	0.775	0.005	0.284	0.756	0.082	0.360	1.367	0.008	0.553
UK	**1**	0.233	0.000	0.095	-0.079	0.080	0.012	0.270	0.000	0.271
	5	0.770	0.000	0.081	1.050	0.346	0.096	0.724	0.000	0.434
	10	0.967	0.000	0.076	0.175	0.767	0.057	1.023	0.000	0.654
	15	1.159	0.000	0.093	1.467	0.331	0.051	1.172	0.000	0.618
	20	1.173	0.003	0.165	0.076	0.844	0.050	1.242	0.005	0.536
JP	**1**	0.041	0.133	0.013	0.557	0.076	16.65	0.041	0.098	0.003
	5	0.170	0.154	0.038	1.761	0.182	9.014	0.324	0.108	0.057
	10	0.245	0.249	0.176	2.693	0.165	11.40	0.544	0.175	0.089
	15	0.299	0.318	0.216	1.511	0.311	36.70	0.699	0.238	0.211
	20	0.293	0.415	0.249	6.607	0.027	1.510	0.794	0.313	0.318
FR	**1**	0.165	0.000	0.002	0.169	0.000	0.040	0.198	0.000	0.046
	5	0.643	0.007	0.140	0.878	0.000	0.040	0.688	0.016	0.186
	10	0.565	0.117	0.107	1.024	0.012	0.056	0.619	0.106	0.104
	15	0.621	0.131	0.064	0.926	0.003	0.065	0.658	0.092	0.028
	20	0.807	0.100	0.054	0.029	0.002	0.113	0.817	0.090	0.004
GE	**1**	0.122	0.006	0.000	-	-	-	-	-	-
	5	0.656	0.007	0.001	-	-	-	-	-	-
	10	0.557	0.076	0.004	-	-	-	-	-	-
	15	0.866	0.092	0.007	-	-	-	-	-	-
	20	1.260	0.048	0.006	-	-	-	-	-	-
IT	**1**	-0.016	0.309	0.000	-	-	-	-	-	-
	5	-0.102	0.718	0.000	-	-	-	-	-	-
	10	0.100	0.755	0.001	-	-	-	-	-	-
	15	0.883	0.245	0.003	-	-	-	-	-	-
	20	0.123	0.669	0.004	-	-	-	-	-	-
SP	**1**	0.057	0.031	0.000	-	-	-	-	-	-
	5	0.393	0.059	0.004	-	-	-	-	-	-
	10	0.472	0.155	0.005	-	-	-	-	-	-
	15	0.622	0.129	0.431	-	-	-	-	-	-
	20	0.537	0.196	0.287	-	-	-	-	-	-

Notes: This table presents the results, for each country, of the estimation of the long-horizon returns, $\Sigma_{j=1}^{k}\rho^{j-1}r_{t+j}$, on the log dividend yield $d_t - p_t$, for the horizon *k* = 1, 5, 10, 15, 20 years. The full samples for each country are as in Table 1. P_c denotes $prob\left(b_r > \hat{b}_r, b_d > \hat{b}_d | b_r = 0\right)$, corresponding to the joint test of Cochrane (2008), for 10000 Monte Carlo simulations of the VAR(1) system.

In the full sample, returns are predictable for all time horizons in the US, UK, and they are unpredictable in Japan, and Italy. For the remaining countries, the evidence is mixed: the null hypothesis of no predictability is rejected in Spain (1 year), France (1 and 5 years) and Germany (1, 5 and 20 years). In the subsample analysis, there is evidence of an increase in predictability for the US and the UK in the post-IIWW period, whereas France exhibits the reverse pattern. For Japan, returns are unpredictable in both sub-periods.

Table 4: Multi-period regressions for the dividend growth

		Overall sample			**Pre-IIWW**			**Post-IIWW**		
	k	$\hat{b}_{d,k}$	P_c	R^2	$\hat{b}_{d,k}$	P_c	R^2	$\hat{b}_{d,k}$	P_c	R^2
US	**1**	-0.088	0.000	0.149	-0.410	0.000	0.436	-0.012	0.082	0.002
	5	-0.131	0.001	0.039	-0.368	0.007	0.058	-0.012	0.094	0.007
	10	-0.111	0.012	0.007	-0.233	0.062	0.013	0.017	0.236	0.011
	15	-0.142	0.071	0.006	-0.349	0.102	0.040	0.063	0.431	0.061
	20	-0.084	0.193	0.003	-0.286	0.165	0.011	0.262	0.860	0.125
UK	**1**	-0.068	0.003	0.056	-0.396	0.060	0.016	-0.028	0.048	0.036
	5	0.053	0.193	0.007	-0.397	0.134	0.047	0.109	0.146	0.030
	10	0.142	0.382	0.006	-0.537	0.042	0.052	0.203	0.486	0.064
	15	0.177	0.680	0.000	0.416	0.651	0.048	0.252	0.775	0.092
	20	0.070	0.661	0.009	- 0.617	0.206	0.010	0.187	0.840	0.039
JP	**1**	-0.024	0.126	0.008	0.278	0.726	0.058	-0.028	0.194	0.081
	5	-0.084	0.140	0.042	1.124	0.579	0.001	0.072	0.387	0.022
	10	-0.204	0.127	0.118	1.753	0.678	0.010	0.011	0.362	0.004
	15	-0.293	0.147	0.190	0.219	0.420	0.003	-0.041	0.390	0.047
	20	-0.421	0.152	0.155	5.791	0.937	0.003	-0.122	0.413	0.033
FR	**1**	0.070	0.335	0.000	0.194	0.734	0.002	-0.011	0.214	0.018
	5	-0.142	0.329	0.000	0.008	0.500	0.001	-0.201	0.182	0.000
	10	-0.491	0.189	0.002	0.449	0.606	0.033	-0.362	0.125	0.067
	15	-0.437	0.172	0.000	1.659	0.548	0.024	-0.173	0.232	0.112
	20	-0.289	0.203	0.006	1.582	0.465	0.025	-0.087	0.435	0.096
GE	**1**	-0.193	0.000	0.000	-	-	-	-	-	-
	5	-0.153	0.084	0.002	-	-	-	-	-	-
	10	-0.185	0.059	0.003	-	-	-	-	-	-
	15	-0.048	0.340	0.002	-	-	-	-	-	-
	20	0.104	0.703	0.001	-	-	-	-	-	-
IT	**1**	-0.308	0.000	0.000	-	-	-	-	-	-
	5	-0.948	0.000	0.000	-	-	-	-	-	-
	10	-1.096	0.009	0.002	-	-	-	-	-	-
	15	-0.265	0.385	0.001	-	-	-	-	-	-
	20	-0.617	0.048	0.002	-	-	-	-	-	-
SP	**1**	-0.128	0.000	0.000	-	-	-	-	-	-
	5	-0.500	0.009	0.002	-	-	-	-	-	-
	10	-0.680	0.021	0.000	-	-	-	-	-	-
	15	-0.756	0.032	0.001	-	-	-	-	-	-
	20	-0.990	0.009	0.000	-	-	-	-	-	-

Notes: This table presents the results, for each country, of the estimation of the long-horizon dividend growth rates, $\Sigma_{j=1}^{k}\rho^{j-1}\Delta d_{t+j}$, on the log dividend yield $d_t - p_t$, for the horizon k = 1, 5, 10, 15, 20 years. The full samples for each country are as in Table 1. P_c denotes $prob\left(b_d < \hat{b}_d, b_r < \hat{b}_r | b_d = 0\right)$, corresponding to the joint test of Cochrane (2008), for 10000 Monte Carlo simulations of the VAR(1) system.

Regarding dividend growth predictability, Table 4 reveals that it is present in Spain at all time horizons, and it is completely absent in Japan and France. Dividends are forecastable at time horizons up to ten years in the US, at 1, 2, 5 and 20 years in Italy, and only at 1 year in the UK and Germany. In the subsample analysis, we can observe a decrease in dividend growth predictability for the US and the UK in the post-IIWW period, and there is no discernible trend in the ability to forecast dividends in France and Japan.

In sum, we cannot conclude that long-horizon tests provide an overwhelming increase in power relative to the 1-year tests. This is at odds with Cochrane (2008), who shows that there is a significant increase in power if the time horizon is extended beyond 15 years.

5.1 Dividend Smoothing results

In this section, we discuss the results from the various dividend smoothing measures presented in Section 4.2. We also analyse the connection between these measures and the predictability results. Note that if the dividends are strongly smoothed, the link between the dividend yield and dividend growth will be broken. Thus, the dividend growth won't be forecastable and b_d will tend to zero. Dividend smoothing also increases the dividend yield autocorrelation, φ, which renders its effect on return predictability, b_r, ambiguous (see Equation (7)).

Table 5 reports the estimated dividend behaviour models mentioned in the last section and the smoothness parameter. The models are estimated using OLS, with Newey-West corrected standard errors. We had to exclude Germany due to the lack of data.

The first part of this table reveals that dividends have become more stable in the US after IIWW, according to all the measures considered: the volatility of dividends relative to earnings decreased from 0.525 to 0.234, the speed of adjustment decreased for the models Lintner 1, Lintner 2 and Marsh-Merton, and the smoothness parameter increased from 0.249 to 0.374, for Lintner 3. Comparing these results with Table 4, we conclude that, as expected, more dividend smoothing implies less dividend predictability, in accordance with Chen et al (2012).

In the cross-country comparison, we choose to focus on the post-IIWW values for the US and the UK, because for the remaining countries our data does not cover the pre-war period.

The first column in Table 5 shows the volatility of dividend growth relative to the volatility of earnings growth. By this measure, dividends are the most stable in the US (0.234) and the most volatile in Spain (0.968). It is noticeable that the dividend volatility in Spain is more than twice as high as the dividend volatility in every other country. These results corroborate Rangvid et al (2014) who found that dividends are more stable in larger markets, and Renneboog and Trojanowski (2007) and Denis and Osobov (2008) who showed that dividends are smoother in the US than in France, Germany, and Japan.

Table 5: Dividend policy models estimation

		Lintner 1					Lintner 2					Lintner 3				Marsh-Merton			
	S	***const***	E_t	D_{t-1}	R^2	***SA***	***const***	ΔE_t	ΔD_{t-1}	R^2	***SA***	***const***	E_t	ΔD_{t-1}	R^2	***const***	$ln\left(\frac{P_t+D_t}{P_{t-1}}\right)$	$ln\left(\frac{D_t}{P_{t-1}}\right)$	R^2
US **1872-2016**	0.404	-0.013	0.066	-0.103	0.566	0.103	0.173	-0.659	0.651	0.462	0.349	-0.082	0.022	0.380	0.577	-0.034	0.428	-0.024	0.422
		(-0.38)	(2.98)	(-1.35)			(1.95)	(-0.87)	(3.17)			(-3.99)	(3.63)	(3.87)		(-0.45)	(6.95)	(-1.09)	
1872-1945	0.525	0.008	0.163	-0.281	0.291	0.281	-0.008	0.061	0.249	0.128	0.751	-0.025	0.033	0.249	0.091	-0.278	0.613	-0.099	0.283
		(0.61)	(4.89)	(-4.34)			(-0.91)	(3.04)	(1.58)			(-2.17)	(1.39)	(1.51)		(-1.55)	(8.26)	(-1.71)	
1945-2016	0.234	-0.031	0.066	-0.102	0.524	0.102	0.434	-1.356	0.577	0.486	0.423	-0.206	0.025	0.374	0.543	0.217	0.134	0.040	0.342
		(-0.19)	(2.93)	(-1.26)			(2.19)	(-1.37)	(2.66)			(-3.71)	(4.03)	(4.03)		(2.53)	(1.74)	(1.71)	
UK **1927-2016**	0.511	0.415	0.078	-0.131	0.420	0.131	0.100	7.959	0.617	0.451	0.383	0.009	0.014	0.412	0.382	0.246	0.142	0.052	0.303
		(2.31)	(3.81)	(-2.60)			(0.29)	(3.62)	(8.13)			(0.05)	(2.12)	(4.06)		(2.02)	(2.15)	(1.41)	
1927-1945	0.800	0.323	-0.035	-0.173	0.245	0.173	0.002	0.135	0.429	0.219	0.571	0.077	-0.026	0.467	0.220	-0.986	0.497	-0.326	0.193
		(1.91)	(-0.71)	(-2.02)			(0.06)	(0.27)	(2.28)			(0.46)	(-0.48)	(3.70)		(-1.99)	(3.08)	(-2.07)	
1945-2016	0.413	0.660	0.078	-0.134	0.416	0.134	0.095	8.647	0.619	0.442	0.381	0.030	0.014	0.411	0.353	0.423	0.058	0.103	0.294
		(2.44)	(3.82)	(-2.64)			(0.19)	(3.41)	(7.66)			(0.12)	(2.04)	(4.05)		(4.20)	(1.25)	(3.36)	
JP **1956-2016**	0.461	0.190	0.066	-0.181	0.366	0.181	0.256	1.094	0.230	0.100	0.770	-0.597	0.035	-0.027	0.249	0.070	0.140	0.005	0.320
		(0.63)	(3.52)	(-3.06)			(1.26)	(1.07)	(2.51)			(-1.68)	(2.08)	(-0.16)		(0.64)	(1.92)	(0.20)	
FR **1971-2016**	0.321	349.68	0.111	-0.181	0.156	0.181	1739	523	-0.200	0.056	1.200	254.69	0.039	-0.300	0.150	-0.166	0.303	-0.081	0.164
		(1.19)	(1.74)	(-1.55)			(2.86)	(0.74)	(-0.83)			(0.62)	(2.12)	(-1.07)		(-0.85)	(5.41)	(-1.41)	
IT **1984-2016**	0.431	1.597	0.132	-0.276	0.395	0.276	0.555	1.533	0.308	0.119	0.692	-0.385	0.021	0.265	0.100	-1.107	0.232	-0.327	0.340
		(1.02)	(3.65)	(-3.75)			(0.46)	(1.08)	(1.00)			(-0.25)	(0.61)	(1.10)		(-3.18)	(2.33)	(-3.31)	
SP **1979-2016**	0.968	-2.476	0.132	-0.110	0.210	0.110	0.899	14.53	-0.023	0.239	1.023	-3.830	0.115	-0.342	0.259	-0.062	0.139	-0.048	0.167
		(-1.47)	(3.27)	(-1.19)			(0.83)	(3.83)	(-0.14)			(-2.20)	(2.80)	(-1.82)		(-0.21)	(0.61)	(-0.57)	

Notes: This table shows the estimation results of the dividend policy models (Equations (9)–(12)). Germany was excluded from this analysis due to the short sampling period (just 12 annual observations). D_t is the level of dividends, E_t is the level of earnings, ΔE_t is the change in earnings, ΔD_{t-1} is the lagged change in dividends and P_t is the price level. All these variables are in real values. t-tests for each parameter are reported in parenthesis. S is the smoothness coefficient measure and SA is the speed of adjustment.

The speed of adjustment (SA) in models Lintner 1 and 2 assesses how fast firms adjust their dividends in response to an earnings shock. In Lintner 1 the speed of adjustment is the fastest for Italy (0.276), followed by Japan and France (0.181), and the slowest for the US (0.102). According to Lintner 2 dividends are more persistent in the US and the UK than in the other countries. Curiously, French and Spanish companies increase their dividends, following a positive earnings shock, by more than 100% of the long-term dividend hike implied by the target payout ratio.

In Litner 3 the coefficient on the lagged change in dividends is positive and highly significant for the US and the UK, which indicates that firms in these countries engage in strong dividend manipulation. Unexpectedly, for Japan, France, and Spain this coefficient is negative, but it is not significantly different from zero at the 5% significance level.

The coefficient λ_1, in the Marsh-Merton model, captures the response of dividends to permanent earnings changes. US and UK firms are the slowest to react to an earnings shock, as in most other models, while French firms are the fastest ones.

Overall, the different measures of dividend smoothing show some consistency, as they all rank the US and the UK among the countries where dividend persistence is stronger. However, there is some incoherence for the remaining countries. Spain presents the highest dividend volatility and the lowest dividend smoothing according to Lintner 3, but Lintner 1 shows that this is the second country that most manipulates dividends. For France Lintner 2 and the Marsh-Merton models place it as the country that least practices dividend smoothing, but its dividend volatility is the second lowest.

These results provide some support to the hypothesis that dividend growth is unpredictable in countries where firms smooth their dividends. Dividend growth is unforecastable after the IIWW in the US, and in the UK it is predictable only at the 1-year horizon. However, dividends are strongly predictable in Spain and Italy, and unpredictable in France and Japan, even though these countries exhibit a similar degree of dividend smoothing.

6. Conclusion

The finance literature claims that the dividend yield variation can be explained by news about future returns and future dividends, which means that one can trace price movements back to visible news about dividends or cash flows. In the present study, we confirm some of the much highly reproduced results for the US. In fact, for the US aggregate stock market, the expected future returns account for most of the observed variation in the dividend yields.

We extended the analysis of previous studies by considering six additional countries that, jointly with the US, represent close to 85% of the MSCI World Index. Our results for the post-IIWW period reveal that returns are predictable in the US and the UK but dividends are unpredictable, while the opposite pattern is observed in Spain and Italy. In

Germany, there is some evidence of short-term predictability for both returns and dividends, while in France only returns are predictable. In Japan, neither variable can be forecasted.

The dividend smoothing results show that dividends are more persistent in the US and the UK than in the remaining countries. The various measures of dividend volatility do not provide a consistent ranking for Japan, France, Italy, and Spain (Germany was excluded from the analysis due to the lack of data).

We also show that our results provide mild support to the hypothesis that dividend predictability is lower in countries where dividends are strongly manipulated. There is no dividend predictability in the US and the UK, where dividend smoothing is strongest, but we cannot establish a clear connection between dividend volatility and predictability for the other countries.

Cross-country comparisons of dividend smoothing measures must be conducted with caution. Different accounting standards across countries may compromise earnings comparability, which adds noise to our estimators of dividend persistence. Besides, our database does not cover the same time span in different countries.

In summary, we think that our study provides some novel insights regarding the cross-country analysis between dividend smoothing and predictability and, even though it has some flaws, it opens the door to further research that, using a more comprehensive database or more sophisticated methods, can either confirm or disprove them.

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