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The other January effect: International, style, and subperiod evidence

Chris Stivers[a], Licheng Sun[b,*], Yong Sun[c]

[a]Terry College of Business, University of Georgia, Athens, GA 30602, USA
[b]College of Business and Public Administration, Old Dominion University, Constant Hall, Norfolk, VA 23529, USA
[c]Research Institute of Economics and Management, Southwestern University of Finance and Economics Chengdu, SiChuan Province, China

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Abstract

We report international, style, and subperiod evidence for the other January effect (OJE) documented in Cooper et al. [2006. The other January effect. Journal of Financial Economics 82, 315–341]. When examining the OJE in 22 countries starting as early as 1801, we find that the spread between 11-month returns following positive and negative Januarys does tend to be positive. However, the spreads are rarely statistically significant and the returns of other calendar months exhibit similar subsequent 11-month return spreads. Further, the international OJE spreads and the OJE spreads in disaggregate U.S.-style portfolios are more related to the U.S. market-level January return, rather than the respective country-specific or portfolio-specific January return. Finally, the OJE is weaker over the 1975–2006 post-discovery period than over the 1940–1974 pre-discovery period. Our evidence indicates that the OJE is primarily a U.S. market-level-based phenomenon that has diminished over time, which suggests a 'temporary anomaly' interpretation.

JEL classification: G10; G11; G12; G14

Keywords: The other January effect; Return seasonalities; Asset pricing; Market returns

*Corresponding author. Tel.: +1 757 683 6552.
E-mail addresses: cstivers@terry.uga.edu (C. Stivers), lsun@odu.edu (L. Sun), ysun@swufe.edu.cn (Y. Sun).

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1. Introduction

Cooper, McConnell, and Ovtchinnikov (2006) (hereafter CMO) document an interesting seasonality in U.S. stock returns. The 11-month holding period returns from February to December conditional on positive January returns are significantly higher than those conditional on negative January returns. CMO call it the other January effect (OJE) to distinguish it from the well-known January effect that documents strong positive returns in small-cap firms in January. For value-weighted excess market returns over their primary 1940–2003 sample period, they find that the spread between the average 11-month return following positive January returns and the average 11-month return following negative January returns is a significant 14.7%. The spread is even more sizable using equal-weighted market returns.

In this article, we report new international, style, and subperiod evidence on the OJE. Our broad goals are to better understand the pervasiveness and nature of the OJE, and to present evidence that bears on potential explanations for the OJE.

In our view, there are three primary potential explanations of the OJE. First, the OJE might be attributable to a priced risk factor. If so, we would expect that the OJE would also exist in international markets and that the OJE should persist over time. For example, Fama and French (1998) show that the value premium identified in U.S. data is also pervasive in the international stock markets, and is likely to proxy for a distress risk factor. However, CMO find that the OJE magnitude does not vary across portfolios with different exposures to the three factors of Fama and French (1993), which casts doubt on a risk-based explanation. Nevertheless, we consider a risk-based possibility when evaluating the international data since other asset pricing factors are possible beyond the Fama-French three-factor model.

Second, if the OJE is related to a pervasive and persistent behavioral bias, then we should also expect the OJE to show up in the international equity markets and to persist over time. For example, the momentum phenomenon in Jegadeesh and Titman (1993), which many authors believe can be attributed to investors' behavioral biases, is found to exist in international markets. See, for example, the empirical evidence in Rouwenhorst (1998) and Griffin et al. (2003).

Third, the OJE could be a temporary anomaly in the sense of Schwert (2003). Anomalous return behavior can be attributed to two primary explanations. To begin with, an anomaly might simply be a statistical aberration with no underlying economic explanation. Alternately, a return anomaly might primarily be tied to a specific period of history, as the realized returns responded to the economic and trading environment at the time. Presumably, the anomalous price behavior is unlikely to persist because the causality is not risk-based and investors eventually recognize the pattern (and may try to trade and exploit the pattern).[1] In this case, researchers might gain economic intuition about what was originally behind the anomalous return behavior, but the results are unlikely to be useful looking forward.

[1]For example, Schwert (2003) shows that the 'Turn-of-the-Year' effect (where most of the small-firm premium appeared to be captured in the first two weeks of January) has gotten appreciably weaker since its discovery. Prior studies have suggested the effect may be due to portfolio rebalancing where investors realize losses for tax reasons. Further, investments funds that have tried to exploit this pattern appear to have had little success.

As pointed out by Schwert (2003), one obvious approach to evaluate whether a particular return phenomenon is a temporary anomaly is to investigate whether the pattern is evident in an independent sample. In the case of the OJE, CMO did test the OJE using an earlier sample. Over 1857–1939, they find the spread in excess returns is much smaller at 4.21%. CMO point out that this decreased spread is largely attributable to a −25.8% spread around the Great-Depression era from 1929 to 1939. If the Great-Depression sample is excluded, the spread in excess returns is positive at 7.8% in the 1857–1928 sample. Thus, there is mixed evidence in the earlier sample, with the earlier-period OJE being weaker than the OJE observed over CMOs primary sample.

In our view, the 'temporary anomaly' OJE explanation suggests that the OJE is likely to be concentrated more in a particular country (or small number of countries), is likely to be much stronger over one particular period, and is likely to have diminished substantially since it became publicized. Accordingly, we investigate whether the OJE relation is primarily concentrated in the U.S. and whether the effect has substantially diminished since 1975. In our study, we focus on a 1940–1974 pre-discovery subperiod and a 1975–2005 post-discovery subperiod, based on the OJE recognition in the 1974 edition of the *Stock Trader's Almanac* (see the CMO study).[2]

We begin by testing for the existence of the OJE using international stock market returns from 22 countries, with data starting as early as 1801 and concluding in 2005. Overall, we find that the OJE tends to be weaker in non-U.S. equity markets. Individually, only two of 22 countries exhibit positive and statistically significant OJE spreads in excess returns at a 5% p-value. In addition, for the eight major equity markets with sample histories available over the entire 1940–2005 period (Australia, Canada, France, Germany, Italy, Japan, Sweden, and the United Kingdom), we find: (1) essentially no incremental OJE relation tied to the own-country's January returns after first controlling for the OJE relation tied to the U.S. market's January returns; (2) an insignificant OJE spread of only 0.30% when collectively evaluating all eight countries as one data set; and (3) weaker OJE spreads over 1975–2005 than over 1940–1974.[3]

Next, we further investigate the nature of the OJE phenomenon in U.S. data. Specifically, we investigate the OJE across disaggregate stock portfolios based on industry, book-to-market, and size. Our first goal is to evaluate cross-sectional variation in the OJE spreads. The second is to examine subperiod evidence across a variety of portfolios.

Consider the following three cross-sectional possibilities. First, if the OJE is related to an ubiquitous behavioral bias such as a pervasive under-reaction to January information flows, then one would expect an incremental OJE spread tied to the own-portfolio January return, beyond the OJE spread tied to the market-level January return. Second, if the OJE is risk based, then the OJE should be more pronounced in disaggregate portfolios that are formed to have high risk-factor exposure. For these first two possibilities, one would also expect the OJE to also be reliably evident in the post-discovery period. A third possibility is that the OJE phenomenon might: (1) generally be weaker in disaggregate portfolios as compared to the market; (2) exhibit no apparent pattern in its cross-sectional variation;

[2]We feel our post-discovery period breakpoint is conservative in that it assumes public recognition of the phenomenon does not start until 1975.

[3]Across these eight major countries, the median OJE spread is 6.09% over 1940–1974 versus −0.18% over 1975–2005, and seven countries have positive OJE spreads over the earlier period versus only four in the latter period.

(3) exhibit little spread tied to the own-portfolio's January return, beyond the spread tied to the market-level January returns; and (4) be routinely weaker over the post-discovery period, as compared to the pre-discovery period. This third possibility seems at odds with either a risk-based explanation or an ubiquitous behavioral-bias explanation, but rather seems to fit a 'temporary anomaly' explanation.

Our U.S. style-based findings include the following. Industry-level returns also tend to exhibit OJE spreads tied to the own-industry's January return. However, the industry OJE spreads are larger when conditioning upon the U.S. market-level January returns than when conditioning upon the respective industry's January return. For example, across our sample of 30 industries, the average (median) OJE spread tied to the market-level January return is 13.52% (13.45%) versus 8.61% (8.82%) for the OJE spread tied to the own-industry January return. Further, after first controlling for the market-level January return, the own-industry January return exhibits almost no incremental OJE spread. In the size and book-to-market portfolios, the OJE tied to market-level returns is also stronger than the OJE tied to own-portfolio returns.

For all the various U.S. style portfolio returns, as well as for the U.S. market-level returns, we also document that the OJE spread is weaker over the 1975–2006 post-discovery period than for the 1940–1974 pre-discovery period. For example, across the 30 industries, the average (median) OJE spread is 13.78% (13.11%) over 1940–1974 versus only 3.68% (2.95%) over 1975–2006. Overall, our findings are more in line with the third possibility for the U.S. style evidence that we proposed above, which supports a 'temporary anomaly' OJE explanation.

To sum up, both our international evidence and our U.S. style-based evidence indicate that the OJE effect is primarily a U.S. market-level-based phenomenon that has diminished since 1975. In regard to the three potential OJE explanations that we offered earlier, our collective results favor the 'temporary anomaly' explanation over the other two potential explanations. This interpretation suggests the OJE is unlikely to be evident in future returns.

This article is organized as follows. Section 2 describes the data. Sections 3 and 4 present our international OJE evidence and U.S. style OJE evidence, respectively. In Section 5, we offer some final conjecture about interpreting the OJE phenomenon. Section 6 concludes.

2. Data description

The international return data for this study is from Global Financial Data, which provides time series of international equity and interest rate data going back as early as 1801. A long time series is particularly desirable when studying the OJE for two reasons. First, a phenomenon with an annual cycle requires long periods for statistical power. Second, very long periods allow for an examination of subperiod differences, which is important when studying potential anomalies.[4] See the Bouman and Jacobsen (2002) study of 'sell-in-May' effect as an example of another study that features this data source.

[4]Independent from our article, Eaton and Pinder (2007) also investigates the OJE using international data. Easton and Pinder focus on an international country-by-country examination of the OJE with data that starts in 1974 or later. Our work extends beyond their study in many dimensions, to include an evaluation of: (1) a much longer sample period, (2) international subperiod results that compare the pre-discovery and post-discovery periods, (3) U.S. OJE spillover to the international markets, and (4) U.S. style-based evidence with industry-level portfolios, book-to-market portfolios, and size-based portfolios.

Table 1
Descriptive statistics for international monthly returns.
This table reports descriptive statistics for the monthly stock returns of the 22 countries. The last columns reports their correlations with U.S. market returns, which is calculated using CRSP value-weighted index returns over the 1977–2005 period.

	Sample period	Mean (%)	Std. dev. (%)	Minimum (%)	Maximum (%)	Correlation with U.S.
Australia	1883–2005	1.041	3.74	−42.13	23.16	0.531
Austria	1970–2005	0.906	5.37	−23.39	28.34	0.248
Belgium	1951–2005	0.931	4.18	−31.22	24.07	0.501
Canada	1934–2005	0.924	4.31	−22.52	16.54	0.806
Denmark	1970–2005	1.205	4.90	−13.84	18.80	0.447
Finland	1962–2005	1.494	6.27	−26.88	32.61	0.407
France	1896–2005	1.074	5.93	−21.82	88.45	0.574
Germany	1870–2005	0.960	11.50	−92.37	333.37	0.315
Greece	1977–2005	2.159	10.37	−22.76	68.46	0.204
Hong Kong	1970–2005	1.900	10.09	−43.44	67.43	0.440
Italy	1925–2005	1.238	7.81	−26.44	59.87	0.367
Japan	1921–2005	1.184	6.34	−30.23	67.38	0.352
Malaysia	1973–2005	1.025	8.79	−34.78	36.22	0.334
Netherlands	1951–2005	1.058	4.86	−22.29	22.55	0.669
Norway	1970–2005	1.196	7.01	−27.42	26.10	0.546
Singapore	1970–2005	1.101	8.10	−41.86	47.51	0.487
South Africa	1961–2005	1.569	6.36	−27.29	19.62	0.380
Spain	1941–2005	1.189	5.10	−25.27	26.95	0.489
Sweden	1919–2005	0.977	5.12	−30.56	34.96	0.527
Switzerland	1967–2005	0.860	4.76	−24.62	22.62	0.615
Thailand	1976–2005	1.437	9.23	−29.75	38.41	0.287
U.K.	1801–2005	0.607	3.48	−26.51	54.10	0.656

For statistical power reasons, we apply a screen that requires the length of monthly equity return series to be larger than or equal to 25 years. In addition, since we are interested in excess returns, we require that short-term interest rate data should also be available for the same sample period to match equity returns. This leaves us with a total of 22 countries. The longest time series is from the U.K., dating back to January 1801.[5] The shortest sample comes from Greece, starting at January 1977. All of the international return data ends in December 2005.

Table 1 reports the summary statistics for the monthly returns of the various countries. The average monthly returns range from 0.61% in the U.K. to 2.16% in the case of Greece. The monthly return standard deviations vary from only 3.48% in the U.K., up to 11.50% for Germany. Table 1 also reports the correlations of these 22 international markets with the U.S. market returns over 1977–2005. We choose this time period because returns for all the 22 countries are available during this sample period, which makes the correlation coefficients comparable to each other. We find that the highest correlation is with the Canadian market at 0.8058 and the lowest is with Greece at 0.2041. For 13 out of the 22 markets, the correlation with the U.S. market returns is less than 0.5. Overall, as one would

[5]Relaxing the requirement for interest rate data allows us to extend the U.K. equity returns to go as far back as 1695. OJE results with raw returns are reported in the Appendix.

desire for an international investigation of a potential U.S.-based return anomaly, these statistics indicate there are sizable differences across the monthly stock returns of the 22 countries and the U.S.

For the U.S., we collect and use the following data for our analysis over 1940–2006. For market-level stock returns, we investigate both the value-weighted and equal-weighted stock index data using the NYSE/AMEX/NASDAQ total index returns from the Center for Research in Security Prices (CRSP). For perspective, we note that the proportion of positive January value-weighted excess returns are 64.2%, 62.8%, and 65.6% for the overall period (1940–2006), the pre-discovery period (1940–1974), and the post-discovery period (1975–2006), respectively.

For U.S. style-based stock portfolio returns, we use the monthly returns of industry portfolios, book-to-market-based portfolios, and size-based portfolio, all from the Kenneth French data library maintained at Dartmouth College. For the industries, we examine value-weighted returns for the 30 industry portfolios provided in the French data library. For the book-to-market and size-sorted portfolios, we examine value-weighted returns of quintile portfolios based on either book-to-market sorts or size-based sorts. We also use the risk-free return from the French data library. Finally, from the Federal Reserve, we collect monthly observations of the U.S. industrial production (IP) and the bond default yield spread (DYS), defined as the difference between Moody's Baa and Aaa yields.

3. International results

3.1. Main empirical results

We begin by analyzing whether the international return data exhibit a similar OJE phenomenon. Initially, we follow the approach of CMO to test for the existence of the OJE in each of the 22 countries in our sample. Specifically, we use a January dummy variable J_t in the regression:

$$r_t^{INT} = \alpha + \beta J_t^{INT} + \varepsilon_t, \tag{1}$$

where r_t^{INT} is the 11-month excess return from February to December in year t for the respective country, with superscript INT referring to International (rather than the U.S. variables that we examine in later work). $J_t^{INT} = 1$ if the January excess return in year t for the respective country is positive and $J_t^{INT} = 0$ otherwise. We test the null hypothesis that β is significantly different from zero. If β is significant and positive, this is viewed as evidence in support of the OJE. Note that β can also be interpreted as the spread in returns between positive and negative Januarys.

While Eq. (1) is the featured specification in CMO, it has the drawback that potentially useful information might be lost when only considering a dummy variable. For completeness, we also run the following regression where the excess January return is used in lieu of the January dummy as the explanatory variable[6]:

$$r_t^{INT} = \alpha + \beta r_{J,t}^{INT} + \varepsilon_t, \tag{2}$$

[6]We thank the referee for suggesting this test.

where $r_{J,t}^{INT}$ is the January excess return for year t for the respective country and the other terms are as defined for Eq. (1). Here, a reliably positive estimate for the β coefficient would indicate that the subsequent 11-month return varies positively with the January return, which is another way to express the OJE.

Panel A of Table 2 reports on estimating Model (1) on the returns of the 22 different countries. We report the average 11-month excess return following positive and negative Januarys and their spread (β). Overall, 17 out of 22 countries have positive spreads. However, individually, only Spain and Thailand have spreads that are significant and positive at the 5% significance level. The spreads (p-values) of Spain and Thailand are 15.67% (0.0035) and 39.58% (0.0093), respectively. Switzerland and the U.K. have positive spreads at a 10% significance level. On the other hand, Italy has a significant but negative spread at a 10% significance level.

Table 2, Panel B, reports the results for Model (2) where the regressor is the signed January return. At a 5% significance level, only Spain and the U.K. have slope coefficients that are reliably positive. Overall, 14 countries have positive slope coefficients and eight

Table 2
The other January effect in international markets.

This table reports how the subsequent 11-month holding-period returns are related to the January return. Panel A reports on the simple approach with the January dummy (Eq. (1)). The mean 11-month returns for both positive and negative Januarys is reported, as well as the return spread and the spread's p-value. N stands for the number of positive or negative Januarys. Panel B reports on an alternate approach that uses the continuous January return as an explanatory variable for the subsequent 11-month return (Eq. (2)). Following from CMO, this table reports on excess returns for both January and the 11-month February to December period.

	Positive Januarys		Negative Januarys		Spread (%)	p-Value
	Returns (%)	N	Returns (%)	N		
Panel A: With January dummy approach						
Australia	7.38	99	5.08	24	2.30	0.474
Austria	8.3	17	2.54	19	5.76	0.523
Belgium	2.39	38	4.81	17	−2.42	0.628
Canada	4.97	49	2.96	23	2.02	0.604
Denmark	6.96	25	−4.07	11	11.03	0.283
Finland	12.21	34	−5.92	10	18.13	0.118
France	5.91	73	9.67	37	−3.76	0.556
Germany	4.19	102	−2.13	34	6.31	0.254
Greece	10.97	17	9.17	12	1.80	0.901
Hong Kong	13.06	22	21.36	14	−8.30	0.587
Italy	1.19	51	14.12	30	−12.94	0.088
Japan	9.64	57	5.59	28	4.05	0.476
Malaysia	2.45	24	8.56	9	−6.11	0.632
Netherlands	7.64	39	3.33	16	4.31	0.471
Norway	9.75	25	−6.85	11	16.6	0.207
Singapore	8.21	26	7.92	10	0.30	0.985
South Africa	9.49	27	6.50	18	2.99	0.648
Spain	10.72	43	−4.96	22	15.67	0.004
Sweden	5.05	64	3.24	23	1.81	0.720
Switzerland	10.33	24	−1.26	15	11.59	0.089
Thailand	24.58	18	−15.01	12	39.58	0.009
U.K.	2.73	149	−0.82	56	3.56	0.070

Table 2 (*continued*)

	Intercept	t-Stat.	Slope	t-Stat.	R-square
Panel B: With continuous January excess return					
Australia	0.0582	4.18	0.00645	1.86	0.0278
Austria	0.0532	1.18	−0.00140	−0.18	0.0009
Belgium	0.0305	1.21	0.00045	0.09	0.0002
Canada	0.0427	2.14	0.00029	0.08	0.0001
Denmark	0.0288	0.51	0.00233	0.24	0.0017
Finland	0.0391	0.71	0.01173	1.53	0.0527
France	0.0835	2.56	−0.00450	−0.91	0.0075
Germany	0.0286	1.16	−0.00129	−0.41	0.0012
Greece	0.0836	1.11	0.00457	0.67	0.0161
Hong Kong	0.1706	2.12	−0.00192	−0.25	0.0018
Italy	0.0809	2.08	−0.00745	−1.52	0.0284
Japan	0.0796	2.92	0.00157	0.61	0.0045
Malaysia	0.0605	0.99	−0.00463	−0.79	0.0195
Netherlands	0.0560	1.89	0.00320	0.64	0.0076
Norway	0.0032	0.05	0.01088	1.28	0.0462
Singapore	0.0866	1.1	−0.00119	−0.17	0.0008
South Africa	0.0835	2.58	−0.00049	−0.1	0.0002
Spain	0.0240	0.88	0.012360	2.68	0.1022
Sweden	0.0355	1.49	0.00415	1.13	0.0147
Switzerland	0.0468	1.33	0.00639	1.02	0.0273
Thailand	0.0694	0.83	0.00457	0.62	0.0137
U.K.	0.0075	0.85	0.00729	4.03	0.0741

have negative coefficients. Hence we conclude these results are broadly consistent with the case where the January dummy is used.

When comparing the U.S. value premium and the U.S. momentum evidence to international evidence on the same phenomena, prior studies have found that the phenomena are largely similar across countries. For example, Fama and French (1998) provide evidence that the value premium exists in 12 out of a total of 13 major markets. Rouwenhorst (1998) reports that momentum strategy works in 11 of the 12 European countries studied in his article. In contrast, the OJE is evident in only four out of 22 countries, based on a 10% statistical significance. Thus, the OJE phenomenon appears much less pervasive across countries, as compared to the well-known value premium and momentum pattern.

Thus, at first glance, the OJE international evidence is weak and casts doubt on OJE explanations related to an international risk factor or an ubiquitous behavioral bias. However, overall, the substantial majority of the OJE spreads are positive so some readers might conclude that the results are roughly consistent with the U.S. OJE phenomenon. Additional analysis seems warranted to better understand the international evidence. We next evaluate the international evidence in several additional dimensions.

3.2. *Subsequent spreads for other calendar months*

To begin with, is January unusual in terms of linking the spread in subsequent 11-month returns to the sign of the monthly return? If the January spread is clearly stronger than comparable spreads for other calendar months, this would favor the interpretation of a pervasive OJE phenomenon internationally. On the other hand, if several other months also exhibit similar subsequent spreads as compared to the January spread, then this would cast doubt on a belief that the January return is special.

Table 3 reports the spreads in 11-month excess returns following a positive or negative monthly excess return for all 12 months. We report the average spread, the median spread, the number of countries with positive spreads, and the number of countries with positive and significant spreads at the 5% and 10% levels, respectively. We find that January and the other calendar months tend to exhibit similar spreads in the subsequent 11-month return. For example, in all cases, the average and median spreads are positive. In addition, the number of countries with positive (but not necessarily significant) spreads are similar for the different months, with values ranging from 16 to 21. Recall that for January, this number is 17. Our international results suggest that January is not special in regard to the subsequent 11-month return spread.

3.3. *International subperiod evidence*

When assessing a potential anomaly, it is important to examine subperiods. For our subperiod evidence in this subsection and for our U.S. spill-over analysis in the next subsection, we focus on the eight major equity markets where we have excess returns available over the entire 1940–2005 sample period (Australia, Canada, France, Germany, Italy, Japan, Sweden, and the U.K.). We make this choice for three reasons. First, we wish to investigate major equity markets that have available data both in the pre-discovery period (1940–1974) and the post-discovery period (1975–2005). Second, these are major equity markets and they should presumably be more informationally efficient, as compared to less developed markets, so they may be a better comparison to U.S. results. Third, the return volatility of these eight countries over this time frame is comparable to

Table 3
Subsequent 11-month return spreads for each month's returns.

This table reports the spreads in 11-month holding period returns following a positive or negative monthly return for each calendar month's return, using excess returns. We report the average and median spreads for the 22 non-U.S. countries. Columns four through six report the number of countries with spreads that are positive and significant at a 5% *p*-value, positive and significant at a 10% *p*-value, and positive, respectively. For each country, this table reports on the country's full sample period, as reported in Table 1.

	Average spread (%)	Median spread (%)	5% level	10% level	Positive spreads
January	5.19	3.28	2	4	17
February	6.46	9.31	2	6	18
March	7.77	4.40	0	4	16
April	8.39	6.97	4	5	20
May	6.28	6.00	3	5	18
June	9.33	7.13	3	6	20
July	6.65	4.35	1	4	17
August	7.55	5.65	3	5	17
September	10.64	7.43	7	8	21
October	7.98	5.61	4	5	18
November	6.87	5.28	3	6	19
December	4.39	4.11	2	3	17

Table 4
OJE spillover effect from the U.S.: 1940–2005.

This table reports on the OJE spillover effects from the U.S. to other countries. Here, we report on the eight major countries that have data available over the 1940–2005 period. We estimate the following three models for each country:

$$\text{Model 1}: \quad r_t^{INT} = \alpha + \beta J_t^{INT} + \varepsilon_t,$$

$$\text{Model 2}: \quad r_t^{INT} = \alpha + \gamma J_t^{US} + \varepsilon_t,$$

$$\text{Model 3}: \quad r_t^{INT} = \alpha + \gamma J_t^{US} + \lambda J_t^{INT-US} + \varepsilon_t,$$

where r_t^{INT} is the 11-month excess return over February to December in year t for the respective country (either Australia, Canada, France, Germany, Italy, Japan, Sweden, or the U.K.), J_t^{INT} (J_t^{US}) is a January dummy that equals one if the January excess return for the respective country (the U.S.) is positive and is zero otherwise, J_t^{INT-US} is an 'other-country-only' dummy variable that equals one when J_t^{INT} equals one and J_t^{US} equals zero, and the α, β, γ, and λ are coefficients to be estimated. Panel A reports on Model 1 with J_t^{INT} only. Panel B reports on Model 2 with J_t^{US} only. Panel C reports on Model 3 with the J_t^{US} and J_t^{INT-US} terms. Each panel reports separately on the 1940–2005, 1940–1974, and 1975–2005 periods.

	1940–2005	1940–1974	1975–2005
Panel A: Model1—own-country January dummy			
Average β spread (%)	0.72	1.70	0.75
Median β spread (%)	1.32	6.09	−0.18
β's positive and significant at 5% *p*-value	0	0	0
β's greater than a 10% spread	0	1	1
β's positive	5	7	4
Panel B: Model2—U.S. January dummy			
Average γ spread (%)	10.83	12.06	9.65
Median γ spread (%)	10.33	16.12	9.08
γ's positive and significant at 5% *p*-value	4	3	2
γ's greater than a 10% spread	3	5	3
γ's positive	8	7	8
Panel C: Model3—U.S. and incremental-country January dummy			
Average γ spread (%)	12.42	18.52	9.12
Median γ spread (%)	12.65	12.94	10.15
γ's positive and significant at 5% *p*-value	2	3	2
γ's greater than a 10% spread	5	5	4
γ's positive	8	8	7
Average λ spread (%)	2.71	7.49	0.05
Median λ spread (%)	−0.18	11.31	−0.17
λ's positive and significant at 5% *p*-value	1	3	1
λ's greater than a 10% spread	3	4	2
λ's positive	4	6	4

the U.S., so we avoid the more extreme volatility of the less developed markets. Over 1940–2005, the average standard deviation of monthly equity returns for these eight countries is 5.56%, with a range of 3.45% for the U.K. to 8.26% for Italy, as compared to the U.S. standard deviation of 4.22%.

We begin by estimating Eq. (1) for each of these eight countries, separately over the 1940–2005, 1940–1974, and 1975–2005 periods. Table 4, Panel A, reports the results. We find that none of the individual β coefficients are positive and statistically significant at the

5% level. For each of the three periods, there is only one country that has a reliably positive β at a 10% significance level (Germany in the 1940–2005 and 1940–1974 periods and Italy in the 1975–2005 period).

Further, there is essentially no evidence of an OJE phenomenon in the later post-discovery subperiod with a mean (median) spread of 0.75% (−0.18%), and an even split of four positive and four negative β coefficients. Thus, for these eight major equity markets, the OJE evidence seems quite weak, especially in the post-discovery period.

We also evaluate the OJE evidence for one-half subperiods for all 22 countries. We split the sample for each country into two equal subperiods, denoted as the 'first half' and the 'second half,' based on the available sample for each respective country. Thus, for this exercise, the subperiods for the different countries vary in length and timing. We estimate Eq. (1) separately for both subperiods.

In the first-half subperiods of the 22 countries, we find only three countries have significantly positive spreads at the 10% significance level. At the 5% level, only two countries remain significant. In the second-half subperiods of the 22 countries, the number of countries with positive and significant spreads are one (5% level) and two (10%), respectively. The number of countries with positive (but not necessarily significant) spreads are 15 and 16 for the first-half and second-half, respectively. For the 22 countries, the median spread is 5.2% in the first-half period and 3.2% in the second-half period.

Finally, we also examine all 22 countries in the post-discovery period using data after 1974. For this subperiod, we find results similar to the second-half subperiod with a median spread of 3.2%, 15 positive β coefficients of the 22, and two positive and significant β coefficients.

Overall, we conclude that the subperiod results look much like the results from the entire sample in Table 2. However, for the eight major markets in Table 4, the OJE phenomenon is essentially non-existent in the later period.

3.4. International spill-over of the U.S. OJE

So far, our results indicate that the OJE phenomenon is appreciably weaker internationally as compared to the U.S. We also know that U.S. monthly returns are sizably positively correlated with the monthly equity returns of other countries. Thus, a natural question is whether there is any incremental OJE from the January returns of the non-U.S. countries, after first controlling for the OJE attributed to the U.S. January return.

If there is evidence of an incremental international OJE after controlling for any U.S. spill-over, then this would support the generality of the OJE internationally. On the other hand, if there is little or no evidence of an incremental international OJE after controlling for any U.S. spill-over, then this would suggest a 'primarily U.S.-based OJE' phenomenon and cast doubt on OJE explanations that predict a pervasive OJE across countries.

We estimate the following two models for each of the eight major countries:

$$r_t^{INT} = \alpha + \gamma J_t^{US} + \varepsilon_t, \tag{3}$$

$$r_t^{INT} = \alpha + \gamma J_t^{US} + \lambda J_t^{INT-US} + \varepsilon_t, \tag{4}$$

where r_t^{INT} is the 11-month excess return over February to December in year t for the respective country (either Australia, Canada, France, Germany, Italy, Japan, Sweden, or the U.K.), J_t^{US} is a January dummy that equals one if the January excess return for the U.S. is positive and is zero otherwise, J_t^{INT-US} is an 'other-country-only' dummy variable that equals one when the own-country's January return is positive and the U.S. January return is not positive, and the α, β, γ, and λ are coefficients to be estimated.

The estimated γ coefficient for Eqs. (3) and (4) will indicate the OJE spread that is tied to the U.S. January returns. The estimated λ coefficient for Eq. (4) will indicate the incremental own-country OJE spread that is tied to the own-country's January return, after first controlling for the U.S. spill-over.

Table 4, Panel B, reports on the U.S. spill-over evidence from estimating Eq. (3). The estimated γ coefficients have a median value of 10.3% for the overall sample, are nearly always positive, and are statistically significant in a number of cases. Thus, interestingly, the OJE relation in these eight major markets is appreciably stronger when relating the spreads to the U.S. January return than when relating the spreads to the own-country January return.

Next, Table 4, Panel C, reports on the incremental own-country effect by estimating Eq. (4). We find that the λ coefficient: (1) has a median value near zero for the overall sample and the later subperiod, (2) is positive for only half the countries for the overall sample and the later subperiod, and (3) is positive and significant for three of the eight countries in the first-half subperiod. For all three sample periods with Model (4), the OJE tied to the U.S. January return is stronger than the incremental OJE tied to the own-country's January return.[7]

Finally, we also estimate a more complex specification to isolate the return spread tied solely to a positive U.S. January return, relative to the base case where both the U.S. January return and the own-country January return are negative:

$$r_t^{INT} = \alpha + \gamma J_t^{US} + \lambda J_t^{INT} + \psi J_t^{US} J_t^{INT} + \varepsilon_t, \tag{5}$$

where the terms are as defined for Eqs. (1)–(4) and the ψ is an additional coefficient on the cross-product dummy term. In this specification, note that: (1) the γ indicates the return spread for the case when the U.S. January return is positive and the own-country's January return is negative, and (2) the λ picks up the same condition as for the λ in Model (4).

When estimating Model (5) over the 1940–2005 period for each of the eight countries, we find that the γ coefficients have a mean and median of 15.8% and 16.0%. The estimated γ is positive for all eight countries and statistically significant with a 10% p-value for three of the eight countries. For the subperiods, the γ coefficients have a mean and median of 19.6% and 19.9% for the first subperiod and 13.8% and 17.6% for the second subperiod. These mean and median γ values are all larger than the comparable λ statistics on the own-country January return in Table 4. We conclude that the OJE phenomenon in these eight major countries is more related to the U.S. January return, rather than the own-country's January return, which does not support the generality of the OJE.

3.5. Evaluating the collective international evidence

In this subsection, we report on two approaches for evaluating the collective international evidence, rather than the country-by-country approach in Tables 2–4. In

[7]When evaluating all 22 countries, we find similar results where the sign of the U.S. January return has information about the subsequent 11-month return for seven different countries at the 10% level.

this subsection, our approach is to assume that the return data across countries are independent. We acknowledge that this assumption is incorrect, given the return correlation across markets and the country-by-country OJE evidence in Table 2, but this approach should bias us towards finding supportive OJE evidence. If we find little evidence to support the OJE with the independence assumption, then alternate assumptions should presumably yield similar conclusions.

We first jointly examine the eight major countries in Table 4 for the reasons explained in Section 3.3. We append the data of all eight countries into a single data set and then estimate model (1) on the aggregated data set. We examine separately the 1940–2005, 1940–1974, and 1975–2005 periods.

For this appended data set including all eight major equity markets, we find that the OJE spread is only 0.30% (t-statistic of 0.11) over the full 1940–2005 sample. For the subsamples, we find that the OJE spread is -1.00% for the 1940–1974 period (t-statistic of -0.22) and 0.86% for the 1975–2005 period (t-statistic of 0.26). Thus, collectively, there is no evidence of a positive OJE spread for these eight major equity markets since 1940.

We next append all of the return data together for all 22 countries using the full time series for each country, as listed in Table 1. In this approach, a country's importance for the overall result depends upon the length of a country's available time series. For the appended data set including all 22 countries, we find a positive OJE spread of 3.29%, which is statistically significant at the 5% level with a t-statistic of 2.21. This value seems quite modest as compared to the U.S. OJE spread of 14.2% over the 1940–2005 period.

Recall that our country-by-country approach in Table 2 indicates that only Spain and Thailand have reliably positive OJE spreads at better than a 5% p-value. We are also interested in whether the other 20 countries (excluding Spain and Thailand) exhibit evidence of a positive OJE when evaluated collectively. For an appended data set including these 20 countries, we find that the OJE spread is an insignificant 1.80% (t-statistic of 1.17).

We next consider a Bayesian analysis of the collective evidence in Table 2. To simplify, our analysis assumes that: (1) if the observed p-value of a country's OJE is less than10%, then an econometrician takes that particular country as a sample observation that verifies the existence of the OJE, and (2) the international samples are independent of each other. For space constraints, we report the details in the Appendix. To summarize, an econometrician who holds the prior beliefs that the odds for the OJE pattern to exist in a particular international market is 50% will revise it down to 18.2% after seeing the data in Table 2.

To sum up, when collectively examining the eight major equity markets in Table 4 over 1940–2005, we find no evidence of the OJE phenomenon. When collectively examining all the 22 countries using all available data, there is evidence of a modest OJE spread of 3.3%. However, the OJE spread falls to an insignificant 1.8% for a 20-country sample that excludes Spain and Thailand. A simple Bayesian analysis of our collective results also casts doubt on a reliable international OJE.

3.6. *Summary of international results*

Overall, our results in Tables 2–4 indicate that the OJE is appreciably weaker internationally, as compared to the U.S. In terms of the subsequent spreads in 11-month returns, our international evidence also indicates that the January return is not special, as compared to the other calendar months. We also find that the OJE spread in major international markets is more tied to the U.S. January returns than to the own-country January returns. These collective results seem to favor an anomaly interpretation for the OJE, over a risk-based explanation or an ubiquitous behavioral-bias explanation.

4. U.S. style and subperiod evidence

Next, we take another look at the U.S. OJE evidence. As explained earlier, we have two primary goals in this section. One is to examine how the OJE varies cross-sectionally for various disaggregate portfolios and the second is to re-examine the subperiod evidence. Here, we examine industry portfolios, book-to-market equity portfolios, and size-based portfolios. For each disaggregate portfolio, we examine OJE spreads tied to: (1) the own-portfolio's January return, (2) the market-level January return, and (3) the own-portfolio's January return, incrementally, after first controlling for the market-level January return. We also examine the overall sample, the pre-discovery period (1940–1974), and the post-discovery period (1975–2006), separately.

We consider three possibilities for the U.S. style-based evidence. First, if the OJE is related to an ubiquitous behavioral bias, then a sizable portfolio-specific OJE may be reliably evident in most disaggregate portfolios. Further, there is likely to be an incremental OJE spread tied to the own-portfolio January return beyond the OJE spread tied to the market-level January return. Second, if the OJE is risk based, then the OJE should be stronger in disaggregate portfolios that are formed to have high risk-factor exposure. Third, the OJE may generally be weaker in disaggregate portfolios (as compared to the market), with no apparent pattern in the cross-sectional variation and with little incremental own-portfolio OJE. Further, the OJE spreads may be consistently weaker in the post-discovery period across the different portfolios. This third possibility seems inconsistent with either a risk-based explanation or an ubiquitous behavioral-bias explanation, so it would seem to support a 'temporary anomaly' OJE explanation.

4.1. Industry-level results

We begin by investigating the OJE for 30 different industry-level returns. We estimate the following three models for on each industry:

$$r_t^{IND} = \alpha + \beta J_t^{IND} + \varepsilon_t, \tag{6}$$

$$r_t^{IND} = \alpha + \gamma J_t^{MKT} + \varepsilon_t, \tag{7}$$

$$r_t^{IND} = \alpha + \gamma J_t^{MKT} + \lambda J_t^{IND-MKT} + \varepsilon_t, \tag{8}$$

where r_t^{IND} is the 11-month industry excess return over February to December in year t, J_t^{IND} (J_t^{MKT}) is a January dummy that equals one if the January excess return for the specific industry (the U.S. market) is positive and is zero otherwise, $J_t^{IND-MKT}$ is an 'industry-only' dummy variable that equals one when J_t^{IND} equals one and J_t^{MKT} equals zero, and the α, β, γ, and λ are coefficients to be estimated. All portfolio returns are value-weighted.

Table 5, Panels A, B, and C, report on Eqs. (6), (7) and (8), respectively. First, in Panel A, note that an industry-specific OJE does tend to be evident with the own-industry's

Table 5
The OJE in U.S. industry portfolio returns.

This table reports on the OJE effect using the monthly return of 30 value-weighted industry returns from the K. French data library. We estimate the following three models for on each industry:

$$\text{Model 1}: \quad r_t^{IND} = \alpha + \beta J_t^{IND} + \varepsilon_t,$$

$$\text{Model 2}: \quad r_t^{IND} = \alpha + \gamma J_t^{MKT} + \varepsilon_t,$$

$$\text{Model 3}: \quad r_t^{IND} = \alpha + \gamma J_t^{MKT} + \lambda J_t^{IND-MKT} + \varepsilon_t,$$

where r_t^{IND} is the 11-month industry excess return over February to December in year t, J_t^{IND} (J_t^{MKT}) is a January dummy that equals one if the January excess return for the specific industry (the U.S. market) is positive and is zero otherwise, $J_t^{IND-MKT}$ is an 'industry-only' dummy variable that equals one when J_t^{IND} equals one and J_t^{MKT} equals zero, and the α, β, γ, and λ are coefficients to be estimated. Panel A reports on the univariate case with J_t^{IND} only. Panel B reports on the univariate case with J_t^{MKT} only. Panel C reports on a bivariate case with the J_t^{MKT} and $J_t^{IND-MKT}$ terms. For each panel, the 'Pos. and Significant at 5%' indicates the number of coefficients that are positive and statistically significant at a 5% p-value. In Panel C, the 'λ's available' row indicates the number of industries, out of 30, where there are available dummy-variable conditions to estimate a λ. Each panel reports separately on the overall 1940–2006 period, the 1940–1974 subperiod, and the 1975–2006 subperiod.

	1940–2006	1940–1974	1975–2006
Panel A: Model 1			
Average β spread (%)	8.61	13.78	3.68
Median β spread (%)	8.82	13.11	2.95
β's positive and significant at 5% p-value	16	18	5
β's greater than a 10% spread	9	20	4
β's positive	29	29	21
Panel B: Model 2			
Average γ spread (%)	13.52	21.33	4.75
Median γ spread (%)	13.45	21.27	4.87
γ's positive and significant at 5% p-value	28	29	2
γ's greater than a 10% spread	28	28	4
γ's positive	30	30	27
Panel C: Model 3			
Average γ spread (%)	12.81	20.60	4.47
Median γ spread (%)	13.41	21.36	4.05
γ's positive and Significant at 5% p-value	23	27	4
γ's greater than a 10% spread	25	28	6
γ's positive	29	30	25
Average λ spread (%)	−2.86	−4.65	−0.62
Median λ spread (%)	−3.92	−3.44	−2.60
λ's positive and significant at 5% p-value	1	0	3
λ's greater than a 10% spread	2	2	10
λ's positive	13	10	14
λ's available	30	26	30

January return. For the 30 industries, the estimated β is positive and significant for 16 industries, with a median value of 8.82%. However, for Panel B, note that the OJE spillover from the market's January return to the industry returns is appreciably stronger and more reliable. For Eq. (7), the estimated γ is positive and significant for 28 industries, with a median value of 13.45%.

In Panel C, we find that the incremental own-industry OJE is essentially non-existent. For Eq. (8), the estimated λ is positive and significant for only one industry, with a median value of -3.92%. In contrast, the estimated γ for the market-level spill-over effect is positive and significant for 23 industries, with a median value of 13.41%.

Next, the subperiod evidence in Table 5 indicates that the OJE spreads are much weaker in the post-discovery period as compared to the pre-discovery period. For the industry-level OJE spreads tied to the own-industry's January return, the mean spread is 13.8% over 1940–1974 (with a 5% p-value for 18 of the 30 industries) versus 3.68% over 1975–2006 (with a 5% p-value for 5 of the 30 industries). For the industry-level OJE spreads tied to the market-level January return, the mean spread is 21.3% over 1940–1974 (with a 5% p-value for 29 of the 30 industries) versus 4.7% over 1975–2006 (with a 5% p-value for only 2 of the 30 industries).

Finally, we also estimate a more complex specification to isolate the return spread tied solely to a positive market-level January return, relative to the base case where both the January market-level return and the January industry return are negative:

$$r_t^{IND} = \alpha + \gamma J_t^{MKT} + \lambda J_t^{IND} + \psi J_t^{MKT} J_t^{IND} + \varepsilon_t, \tag{9}$$

where the terms are as defined for Eqs. (6)–(8) and the ψ is an additional coefficient on the cross-product dummy term. In this specification, note that: (1) the γ indicates the return spread for the case when the market's January return is positive and the own-industry's January return is negative, and (2) the λ picks up the same own-industry condition as for the λ in model (8).

When estimating Eq. (9) over the 1940–2005 period, we find that the γ coefficients have a mean and median of 9.5% and 11.5% across the 30 industries. For 13 of the industries, the estimated γ is positive and statistically significant, with a 10% p-value. For the subperiods, the γ coefficients have a mean and median of 17.8% and 15.7% for the first subperiod and 3.01% and 4.07% for the second subperiod. These mean and median γ values are all larger than the comparable λ statistics on the own-industry January return in Table 5. Thus, the market-level OJE effect is largely evident even when the own-industry January return is negative.

To sum up, our results suggest that aggregation is important for understanding the U.S. OJE. Our findings cast doubt on any explanation that relies upon a general under-reaction to information, or other bias, at the industry level.

4.2. Book-to-market portfolio results

We also investigate the presence of the OJE among value-weighted book-to-market quintile portfolios. For each quintile portfolio, we estimate the models given by Eqs. (6) and (7), but with the returns of book-to-market portfolios replacing the industry portfolios.[8]

Table 6 reports the results. First, in Model 1 in Panel A, a portfolio-specific OJE is evident for each portfolio using the own-portfolio's January return. The magnitude of the spread tends to decline as the book-to-market ratio increases with the own-industry's

[8] We only estimate these two specifications for the book-to-market and size-based portfolios because, in several cases, these diversified portfolios are not sufficiently different than the market return to estimate all the different coefficients.

Table 6
The OJE in U.S. book-to-market portfolio returns.

This table reports on the OJE effect using the value-weighted monthly returns of book-to-market decile portfolio returns from the K. French data library. We estimate the following two models for each respective portfolio:

$$\text{Model 1}: \quad r_t^{BM} = \alpha + \beta J_t^{BM} + \varepsilon_t,$$

$$\text{Model 2}: \quad r_t^{BM} = \alpha + \gamma J_t^{MKT} + \varepsilon_t,$$

where r_t^{BM} is the 11-month portfolio excess return over February to December in year t for the respective book-to-market portfolio, J_t^{BM} (J_t^{MKT}) is a January dummy that equals one if the January excess return for the specific BM portfolio (the U.S. market) is positive and is zero otherwise, and α, β, and γ are coefficients to be estimated. Robust t-statistics are in parenthesis. Panel A reports on Model 1 that includes only the J_t^{BM} dummy and Panel B reports on Model 2 that includes only the J_t^{Mkt} dummy. We use a quintile classification, where the quintile return is an average of the corresponding two deciles. We report on the 1940–2006, 1940–1974, and 1975–2006 periods.

	(1940–2006)	(1940–1974)	(1975–2006)
Panel A: Model 1: β, *own returns*			
Quintile 1	13.13	17.32	9.02
(Low B/M)	(4.18)	(3.80)	(2.40)
Quintile 2	10.30	13.74	6.15
	(4.00)	(3.76)	(1.70)
Quintile 3	11.02	15.27	6.32
	(3.43)	(3.11)	(1.69)
Quintile 4	9.25	16.93	1.50
	(2.57)	(3.69)	(0.33)
Quintile 5	8.29	14.35	2.04
(High B/M)	(1.61)	(1.90)	(0.32)
Panel B: Model 2: γ, *market returns*			
Quintile 1	14.47	20.00	8.33
(Low B/M)	(4.41)	(4.30)	(2.09)
Quintile 2	12.12	16.94	6.55
	(3.76)	(3.88)	(1.73)
Quintile 3	11.93	17.20	6.04
	(3.67)	(3.11)	(1.55)
Quintile 4	13.84	22.56	4.03
	(3.57)	(4.48)	(0.85)
Quintile 5	16.23	27.03	4.04
(High B/M)	(3.65)	(4.27)	(0.87)

January return. For the overall period, the OJE spread for the lowest book-to-market portfolio is 13.13% versus 8.29% for the highest book-to-market portfolio.

Next, in Model 2 of Panel B in Table 6, a market-based OJE spread is evident in all the portfolios when conditioning upon the market-level January return. The portfolio's OJE spread tied to the market's January return is larger than the OJE spread tied to the own-portfolio's January return for all five portfolios. As for similar results in CMO, this is inconsistent with a risk-based explanation since there is essentially no variation in the market-return-based OJE spreads across the book-to-market portfolios.

Next, review the subperiod evidence in Table 6. The OJE spreads are again much smaller in the latter subperiod. The spreads over the 1975–2006 period are roughly 8–23% smaller than the comparable spreads over the 1940–1974 period.

Table 7
The OJE in U.S. size-based portfolio returns.

This table reports on the OJE effect using the value-weighted monthly returns of size-based decile portfolio returns from the K. French data library. We estimate the following two models for each respective portfolio:

$$\text{Model 1}: \quad r_t^{SZ} = \alpha + \beta J_t^{SZ} + \varepsilon_t,$$

$$\text{Model 2}: \quad r_t^{SZ} = \alpha + \gamma J_t^{MKT} + \varepsilon_t,$$

where r_t^{SZ} is the 11-month portfolio excess return over February to December in year t for the respective size-based portfolio, J_t^{SZ} (J_t^{MKT}) is a January dummy that equals one if the January excess return for the specific size-based portfolio (the U.S. market) is positive and is zero otherwise, and α, β, and γ are coefficients to be estimated. Robust t-statistics are in parenthesis. Panel A reports on Model 1 that includes only the J_t^{SZ} dummy and Panel B reports on Model 2 that includes only the J_t^{Mkt} dummy. We use a quintile classification, where the quintile return is an average of the corresponding two deciles. We report on the 1940–2006, 1940–1974, and 1975–2006 periods.

	(1940–2006)	(1940–1974)	(1975–2006)
Panel A: Model 1: β, own returns			
Quintile 1	14.81	31.41	1.22
(Small firms)	(1.80)	(3.92)	(0.11)
Quintile 2	11.66	19.82	4.13
	(2.63)	(3.49)	(0.72)
Quintile 3	11.36	19.67	3.59
	(2.93)	(4.03)	(0.75)
Quintile 4	10.18	17.04	3.47
	(2.97)	(3.91)	(0.82)
Quintile 5	12.38	18.15	6.09
(Large firms)	(3.99)	(3.95)	(1.81)
Panel B: Model 2: γ, market returns			
Quintile 1	19.70	33.73	3.87
(Small firms)	(3.25)	(4.65)	(0.47)
Quintile 2	17.58	28.32	5.44
	(3.79)	(4.64)	(0.99)
Quintile 3	15.45	25.35	4.23
	(3.67)	(4.49)	(0.91)
Quintile 4	14.56	22.43	5.63
	(3.87)	(4.31)	(1.34)
Quintile 5	13.45	18.15	8.22
(Large firms)	(4.40)	(3.95)	(2.42)

4.3. Size-based portfolio results

We also investigate the presence of the OJE among value-weighted, size-based quintile portfolios. For each quintile portfolio, we estimate the models given by Eqs. (6) and (7), but with the returns of size-based portfolios replacing the industry portfolios.

Table 7 reports the results. First, in Panel A, a portfolio-specific OJE is evident for each portfolio using the own-portfolio's January return. There is no apparent pattern in the OJE variation across the size-based portfolios.

Next, an OJE spread is evident in all the portfolios when conditioning upon the market-level January return. For all five size-based quintiles, the portfolio's OJE spread tied to the market-level January return is larger than the portfolio's OJE spread tied to the own-portfolio's January return. For the size-based results, the magnitude of the OJE spreads is larger for the smaller firm portfolios, which is consistent with a risk-based interpretation related to size. However, the results are unique to the earlier pre-discovery period.

Finally, the subperiod evidence in Table 7 indicates that the OJE spreads are again much smaller in the latter subperiod. The spreads over the 1975–2006 period are roughly 10–30% smaller than the comparable spreads in the 1940–1974 period.

4.4. Summary of U.S. style results

Overall, our result in Tables 5–7 indicate that OJE spreads in industry, book-to-market, and size-based portfolios are stronger when conditioning upon the market-level January return than when conditioning upon the respective own-portfolio January return. There is little evidence that the OJE spreads vary with the risk of a portfolio. Indeed, when conditioning upon the own-portfolio January returns, the OJE spread in book-to-market portfolios is stronger in the growth portfolio, which presumably have lower risk premia. Next, the OJE spreads are appreciably weaker for all of the various disaggregate portfolios in the post-discovery periods than in the pre-discovery period. Collectively, this U.S. style

Table 8
Four variations of the U.S. market-level OJE across subperiods.

This table reports on the other January effect (OJE) for the U.S. over the 1940–2006 period with four different variations. Column 1 (column 2) reports on the case where both the sign of the January return and the subsequent 11-month returns are based on the value-weighted CRSP excess return (raw return). Column 3 (column 4) reports on the case where both the sign of the January return and the subsequent 11-month returns are based on the equal-weighted CRSP excess return (raw return). The first reported value is the mean of the subsequent 11-month returns and the return spread between a positive and negative January, in percentage units. For rows one and two in each panel, the value reported in brackets is the percentage of months that the subsequent 11-month return is negative for the stated January condition. For row 3 in each panel, the value reported in brackets is the ratio of this percentage for negative January returns over this percentage for positive January returns. T-statistics for whether the spreads are statistically different than zero are reported in parentheses. Panel A reports on the full sample, Panel B on the 1940–1974 subsample, and Panel C on the 1975–2006 subsample.

	Value-weighted CRSP				Equal-weighted CRSP			
	1. Excess returns		2. Raw returns		3. Excess returns		4. Raw returns	
Panel A: 1940–2006								
Positive January	11.74	[11.6%]	14.63	[13.6%]	11.06	[28.8%]	14.08	[27.8%]
Negative January	−2.34	[58.3%]	3.25	[34.8%]	−7.98	[66.7%]	−2.97	[61.5%]
Spread	14.09	[5.0×]	11.38	[2.6×]	19.05	[2.3×]	17.06	[2.2×]
(t-statistic)	(4.40)		(4.10)		(4.01)		(3.12)	
Panel B: 1940–1974								
Positive January	14.39	[9.1%]	14.46	[13.0%]	13.31	[26.9%]	15.61	[26.9%]
Negative January	−5.09	[61.5%]	0.10	[50.0%]	−11.79	[77.8%]	−9.42	[77.8%]
Spread	19.48	[6.8×]	14.36	[3.8×]	25.11	[2.9×]	25.03	[2.9×]
(t-statistic)	(4.18)		(3.78)		(4.21)		(4.37)	
Panel C: 1975–2006								
Positive January	8.95	[14.3%]	14.82	[14.3%]	8.81	[30.7%]	12.67	[28.6%]
Negative January	0.89	[54.5%]	6.69	[18.2%]	−2.27	[50.0%]	11.54	[25.0%]
Spread	8.06	[3.8×]	8.12	[1.3×]	11.08	[1.6×]	1.13	[0.9×]
(t-statistic)	(2.18)		(2.22)		(1.50)		(0.11)	

and subperiod evidence results favors a 'temporary anomaly' interpretation for the OJE, over a risk-based explanation or an ubiquitous behavioral-bias explanation.

Given this subperiod evidence in disaggregate portfolios, we also re-examine the U.S. market-level OJE over the 1940–1974 pre-discovery period and the 1975–2006 post-discovery period. Table 8 reports the subperiod evidence for four variations of the OJE effect in U.S. market-level returns by reporting on both value-weighted and equal-weighed index portfolios and for both excess and raw returns. Again, the size of the OJE spread is much larger in the pre-discovery period than for the post-discovery period. For example, for the results based on value-weighted excess returns, the OJE spread is 19.5% over 1940–1974 versus 8.1% over 1975–2006. For the results based on equal-weighted raw returns, the OJE spread is 25.0% over 1940–1974 versus 1.1% over 1975–2006. For the results based on both equal-weighted excess returns and raw returns, the OJE spreads are not statistically significant in the post-discovery subperiod. These results support the general conclusion from Tables 5 through 7 that the OJE phenomenon has weakened in the U.S. since 1975.[9]

5. Some final conjecture about the OJE

To summarize, our collective evidence indicates that the OJE is primarily a U.S.-market-level phenomenon that has weakened over time. However, even if one accepts this conclusion, it does not explain why there was a strong OJE spread in the U.S. over the 1940–1974 period. In this section, we offer some conjecture that may help us to better understand the OJE, beyond just assuming the OJE is a statistical aberration.

Our discussion here proceeds along the following path. First, does January appear to be special, as compared to other months, in terms of its economic information? If so, can we conjecture why there was an apparent under-reaction to this information, especially over the pre-discovery period of 1940–1974? Due to the speculative nature of our arguments, we relegate the empirical details to the Appendix.

We begin by examining whether the January return contains information about the subsequent realizations of IP growth and the bond DYS, which are two economic variables that have been exhaustively studied in the literature.[10] We find OJE spreads in these two non-return variables, where: (1) the subsequent IP growth is higher for positive January returns than for negative January returns, and (2) positive January returns are associated with a decrease in the DYS and negative January returns are associated with an increase in the DYS. As compared to other months, the January return is the only month that is reliably informative about both the subsequent DYS change and the subsequent IP growth, and in a manner that is consistent with the OJE return spread (if one assumes that stronger IP growth is good news and that a widening DYS is bad news).

Why might January have more economic information? The majority of firms use December as the end of the fiscal year. Thus, annual performance results should start to come out in January. Moreover, information about consumer spending over the critical holiday period should also largely be reported in January. Much of this information might be considered firm-level information flows, but in aggregate the information should be

[9]Similarly, Eaton and Pinder (2007) find that the OJE spreads for U.S. equally-weighted market returns are not statistically significant after 1972.

[10]The DYS is defined as the difference in yields between Moody's Baa and Aaa rated bonds.

informative about future economic prospects. The U.S. 'State of the Union' address is also given in January.

Next, prior work has used cross-sectional return dispersion (RD) as a measure of the magnitude of firm-level information flows, see Bessembinder et al. (1996). We find that the RD is reliably larger in January, as compared to other months, which supports the contention that January is likely to have relatively high firm-level information flows.

Finally, recall our results in Table 6, Panel A, Model 1, with the book-to-market portfolios. When conditioning upon the own-portfolio January returns, the OJE spread is stronger for the low book-to-market growth firms than for the high book-to-market value firms. This is suggestive that the January return might contain information that relates to subsequent economic growth, assuming that growth-firm returns are more responsive to economic growth.

Given the above observations about January returns and information flows, why might the market have under-reacted to the January information in a manner to have generated the OJE? One possibility is related to experiences over the Great Depression. As noted in CMO, the OJE spread over 1929–1939 was very strong and was in the opposite direction to the OJE spreads over 1940–1974. This implies an over-reaction to information in the Great-Depression era. If so, then investors might have over corrected in years following the Great Depression, which could have translated to a sizable under-reaction in the OJE pre-discovery period.[11]

Also, in Section 3.4, we documented a sizable U.S. OJE spillover to the international markets. This evidence is suggestive of an under-reaction of cross-country information, which is in the spirit of under-reaction being important for understanding the OJE.

To sum up, we first acknowledge that our conjecture in this section is admittedly quite speculative and ad hoc. Nevertheless, the OJE behavior is consistent with a joint hypothesis that January has relatively high information flows and that behavioral influences contributed to an under-reaction of this information, especially over the 1940–1974 period. With continued investor learning and an improvement in market efficiency over time, one would expect such under-reaction (and the OJE) to weaken over time.

6. Conclusion

For U.S. return data, Cooper et al. (2006) document that positive January returns are followed by higher subsequent 11-month returns than negative January returns. This OJE spread may be regarded as a puzzle since they were unable to offer a risk-based or other plausible explanation.

In this article, we offer new evidence on the OJE by studying international data over long periods and by examining U.S.-style and subperiod evidence. Our goals are to understand better the pervasiveness and nature of the OJE, and to present evidence that bears on the potential OJE explanations.

In our empirical investigation, we consider three possible explanations for the OJE. First, the OJE could be driven by an internationally priced risk factor. Second, the OJE

[11]For a simple under-reaction story, one would expect that the February return would be relatively more important than later months in determining the OJE spread. However, CMO find that February is not especially influential in the OJE spread, which is not supportive of a simple under-reaction story.

could result from a ubiquitous behavioral bias. Third, the OJE could be a temporary anomaly in the sense of Schwert (2003). If the OJE is due to one of the first two reasons, we would expect to observe the effect in most international markets and we would expect the effect to persist over time. But if the OJE can better be considered a temporary anomaly, then the OJE is likely to be concentrated in only one or a few countries and the OJE should be weaker in the post-discovery period.

Interestingly, we document a statistically reliable OJE spreads in only two of the 22 countries in our sample. In addition, we find the overall pattern of the 11-month return spreads in various markets looks very similar regardless of the conditioning month (January or other calendar months). Moreover, we find strong evidence that the international OJE spreads are much more related to the U.S. market's January returns rather than the respective own-country January returns.

Next, when examining the OJE spreads in U.S. industry, book-to-market, and size-based portfolios, we find a stronger OJE when conditioning upon the market-level January return than when conditioning upon the respective own-portfolio January return. Incrementally, there is essentially no OJE spread tied to an industry's January returns after first controlling for the OJE spread tied to the market-level January returns. Moreover, there is little evidence that the OJE spreads vary with the risk of a portfolio.

Next, the OJE spreads are appreciably weaker for all of the various disaggregate portfolios in the post-discovery period than in the pre-discovery period. For U.S. index-level returns, the OJE spread is also weaker in the post-discovery period. Finally, for the eight major international equity markets with long available time series (Australia, Canada, France, Germany, Italy, Japan, Sweden, and the U.K.), the OJE spread is essentially non-existent in the post-discovery period. Our findings in data since the early 1970s are consistent with recent evidence in Eaton and Pinder (2007), who also find little international evidence of an OJE phenomenon in more recent times.

In our view, our collective findings cast doubt on explanations for the OJE related to an internationally common risk-factor or an ubiquitous behavioral bias. Collectively, our evidence suggests that the OJE is best viewed as largely being a 'temporary anomaly' in the sense of Schwert (2001). If so, looking forward, it seems unlikely that returns will continue to exhibit an OJE spread.

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Appendix A

A.1. International OJE results with raw returns

Here, we report OJE spreads that are based on raw returns. The results are complementary to our main tables, which focus on excess returns. Table A1, Panel A, reports the OJE in 22 international markets using raw returns. In the case of the U.K. we also report the spread from an extended sample starting from 1695. The spread in this extended sample is quite substantial due to some big returns in the UK market in the early years. We find that, at a 10% significance level, three countries of 22, Spain, Thailand, and

Table A1
The international OJE evidence with raw returns.

	Positive Januarys		Negative Januarys		Spread (%)	*p*-Value
	Returns (%)	*N*	Returns (%)	*N*		
Panel A: International OJE based on raw returns						
Australia	11.08	100	10.86	23	0.22	0.9486
Austria	12.82	20	9.56	16	3.26	0.7325
Belgium	8.8	42	10.94	13	−2.14	0.7031
Canada	8.78	52	9.11	20	−0.33	0.9361
Denmark	14.1	28	10.36	8	3.73	0.7623
Finland	19.94	35	1.58	9	18.36	0.1394
France	10.42	77	14.87	33	−4.45	0.5058
Germany	7.99	106	45.01	30	−37.02	0.1271
Greece	21.89	18	26.17	11	−4.27	0.8015
Hong Kong	18.81	22	26.19	14	−7.38	0.6399
Italy	7.87	53	22.15	28	−14.28	0.0748
Japan	15.01	60	7.69	25	7.32	0.2333
Malaysia	6.43	24	14.07	9	−7.64	0.5669
Netherlands	11.11	41	9.68	14	1.42	0.8219
Norway	17.88	25	0.13	11	17.75	0.1985
Singapore	12.04	26	11.14	10	0.91	0.9565
South Africa	16.99	28	19.14	17	−2.14	0.7594
Spain	16.48	45	2.72	20	13.77	0.0145
Sweden	10.38	66	8.06	21	2.31	0.6786
Switzerland	12.49	25	3.27	14	9.22	0.1892
Thailand	30.72	20	−13.1	10	43.81	0.0065
U.K.	6.76	155	2.95	50	3.81	0.075
U.K. (1695–2005)	142.97	243	5.72	68	137.25	0.0002

	First half		Second half	
	Spread (%)	*p*-Value	Spread (%)	*p*-Value
Panel B: Subperiod analysis based on raw returns				
Australia	1.03	0.789	0.23	0.9661
Austria	8.25	0.5486	−2.25	0.8754
Belgium	−15.24	0.1599	6.68	0.3777
Canada	7.16	0.3011	−4.32	0.4226
Denmark	11.26	0.624	−0.71	0.9597
Finland	10.06	0.5046	25.42	0.2026
France	−11.24	0.3393	1.73	0.8047
Germany	−102.47	0.048	8.43	0.3038
Greece	1.74	0.9503	−11.2	0.6033
Hong Kong	−37.12	0.2343	8.82	0.6221
Italy	−34.41	0.0067	7.96	0.3973
Japan	9.7	0.3619	4.36	0.5775
Malaysia	−10.54	0.612	−4.25	0.8259
Netherlands	−7.5	0.4863	9.49	0.22
Norway	19.85	0.4353	16.03	0.2579
Singapore	−1.84	0.951	3.66	0.8311
South Africa	8.6	0.4148	−11.32	0.2484
Spain	13.54	0.0698	13.9	0.1085
Sweden	4.3	0.4566	0.81	0.9316

Table A1 (*continued*)

	First half		Second half	
	Spread (%)	*p*-Value	Spread (%)	*p*-Value
Switzerland	7.23	0.5433	13.79	0.1617
Thailand	51.33	0.0142	36.3	0.1523
U.K.	2.74	0.0975	5.25	0.1668

the U.K., show significant and positive return spreads. Note that in the case of Italy, the spread is significant but negative.

Table A1, Panel B, reports the subperiod analysis based on raw returns. We find, in the first half of the overall sample, Spain, Thailand, and the U.K. show significantly positive spreads at the 10% significance level. The spreads (*p*-values) for Spain, Thailand, and the U.K. are 13.54% (0.0698), 51.33% (0.0142), and 2.74% (0.0975), respectively. We also notice that Germany and Italy have significant but negative spreads during this subperiod. The results from the second half subperiod analysis are even more striking. There is no significant spread for all the 22 countries at the 10% significance level. The closest is the case of Spain, which has a spread of 13.9%, with a *p*-value of 0.1085. Overall, we conclude that our results based on raw returns are consistent with those based on excess returns.

A.2. The international OJE results from a Bayesian perspective

Here, we examine the collective evidence in Table 2 from a Bayesian perspective. To simplify the analysis, suppose that econometricians agree on the following: if the observed significance level in a given country is less than a pre-specified threshold, say 10%, then that particular country is taken as a sample observation that verifies the existence of the OJE, and *vice versa*. Further assume the international samples are independent of each other. Then the probability of observing the OJE present in m markets out of a total of $n = 22$ countries is given by

$$p(m|\theta n) = \binom{n}{m}\theta^m(1-\theta)^{n-m}, \tag{10}$$

where $\binom{n}{m} = n!/m!(n-m)!$.

Eq. (10) represents the likelihood function of the data. The goal of our Bayesian approach is to elicit a posterior pdf for the model parameter θ, which conveys the econometricians' conviction regarding the OJE after observing the data given a suitable prior belief. Suppose that our prior about θ is vague. Following Zellner (1971), we choose Jeffrey's prior:

$$p(\theta) \propto 1/\theta(1-\theta), \quad 0 \leqslant \theta \leqslant 1. \tag{11}$$

Combining the prior in (11) and the likelihood in (10), the posterior for θ is given by

$$p(\theta|m,n) \propto \theta^{m-1}(1-\theta)^{n-m-1}, \quad 0 \leqslant \theta \leqslant 1 \tag{12}$$

which is a beta pdf with parameters m and $n-m$. The posterior mean of θ is m/n and posterior variance is equal to $m(n-m)/n^2(n+1)$.

Applying the above analysis to the results in Table 2 is straightforward. We find the posterior mean and standard deviation of θ are 0.182 and 0.083, respectively. In other words, an econometrician who holds the prior belief that the odds for OJE to exist in a particular market is 50% will revise it down to 18.2% after seeing the data. If we also include the case of U.S. as an additional sample observation, then the posterior mean and standard deviation become 0.217 and 0.084, respectively. Therefore we conclude that for investors with vague priors, the evidence in support of the OJE appears weak given the sample evidence.

A.3. OJE evidence in world regional indices

We also test for the OJE in three value-weighted world regional indices: Europe, the Americas, and Asia. The data are obtained from Datastream and span the sample period from 1975 to 2006. The returns are based in U.S. dollars and the excess returns are calculated using the U.S. risk-free return. We find the OJE spread is positive in all cases with spreads ranging from 7.3% to 9.3% but the spread is statistically significant only for the Americas and only at a 10% significance level. The result for the Americas is expected, given the U.S. results in Table 8.

A.4. January returns, IP, and the DYS

Here, we provide the empirical detail to support our discussion in Section 5. We begin by examining whether the January return contains information about the subsequent realizations of two non-return economic variables that have been exhaustively studied in the literature. First, we find an OJE spread in subsequent IP growth over the 1940–2006 period. Specifically, positive January excess returns are associated with higher subsequent IP growth over the year than are negative January excess returns. The spread in growth is 3.5%, which is statistically significant at the 5% level.

Second, also over 1940–2006, we find an OJE spread in the subsequent change in the bond DYS over the year defined as the difference in yields between Moody's Baa and Aaa rated bonds. Variations of this variable have been used extensively in the asset pricing literature as a state variable that is informative about the economic state. See, for example, Jagannathan and Wang (1996), who use a DYS to proxy for changes in the risk premium. We find that positive January excess returns (negative January excess returns) are associated with a decrease in the DYS (an increase in the DYS) over the subsequent year. The OJE spread in the DYS change is -0.18%, which is statistically significant at the 5% level.

As compared to other calendar months, the January return is the only month that is reliably informative about the subsequent 11-month DYS change. In terms of the IP growth, three other calendar months are also reliably informative about the subsequent IP growth. Thus, only the January return is reliably informative about both the subsequent DYS change and the subsequent IP growth, and in a manner that is consistent with the OJE return spread (if one assumes that stronger IP growth is good news and that a widening DYS is bad news). Next, consistent with the OJE being weaker in the post-discovery period, we note that the OJE spreads in DYS change and IP growth are appreciably stronger in the 1940–1974 period than in the 1975–2006 period.

Table A2
Cross-sectional return dispersion in January versus other months.

This table reports on the cross-sectional return dispersion (RD) of monthly returns for each of 10 size-based deciles of NYSE and AMEX stocks. The RD is defined as the cross-sectional standard deviation of the monthly individual stock returns for each decile. We report on three sample periods: the entire 1940–2006 period, the 1940–1974 subperiod, and the 1975–2006 subperiod. We report on separate linear regressions for different size-based deciles. We regress the monthly RD against an intercept and a January dummy that equals one if the month is a January. For each regression, we report: (1) the estimated intercept, which indicates the RD mean for the 11 non-January months; and (2) the Δ or spread, which equals the mean RD for the January months minus the mean RD for the 11 non-January months. *p*-values, in parentheses, are reported to indicate whether the spread is statistically different than zero. RD10 denotes the largest size-based decile and RD1 the smallest. RD3–RD10 indicates the return dispersion for firms in the largest eight size-based deciles.

Decile	1940–2006		1940–1973		1974–2006	
	Intcpt.	Δ	Intcpt.	Δ	Intcpt.	Δ
RD3–RD10	0.086	0.014 (0.001)	0.073	0.0098 (0.015)	0.099	0.019 (0.001)
RD10	0.060	0.0090 (0.001)	0.050	0.0047 (0.087)	0.070	0.014 (0.001)
RD9	0.069	0.0073 (0.015)	0.059	0.0050 (0.129)	0.082	0.010 (0.014)
RD2	0.112	0.031 (0.001)	0.093	0.016 (0.009)	0.133	0.047 (0.001)
RD1	0.133	0.042 (0.001)	0.101	0.028 (0.001)	0.167	0.057 (0.001)

Finally, prior work has used cross-sectional RD as a measure of firm-level information flows, see Bessembinder et al. (1996). Here, we check whether the RD is reliably larger in January, as compared to other months. Table A2 reports on this result. We find that the month of January is associated with a reliably high RD than the other months. This supports the contention that January is likely to have relatively high firm-level information flows, which presumably would be an important source for economic-state information when aggregated.

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