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Global, Local, and Contagious Investor Sentiment*

Malcolm Baker
Harvard Business School and NBER

Jeffrey Wurgler
NYU Stern School of Business and NBER

Yu Yuan
University of Iowa Tippie College of Business

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Abstract

We construct indexes of investor sentiment for six major stock markets and decompose them into one global and six local indexes. Relative market sentiment is correlated with the relative prices of dual-listed companies, validating the indexes. Both global and local sentiment are contrarian predictors of the time series of major markets' returns. They are also contrarian predictors of the time series of cross-sectional returns within major markets: When sentiment from either global or local sources is high, future returns are low on various categories of difficult to arbitrage and difficult to value stocks. Sentiment appears to be contagious across markets based on tests involving capital flows, and this presumably contributes to the global component of sentiment.

JEL codes: F30, G14, G15

* Malcolm Baker, Harvard Business School, Baker Library 261, Boston, MA 02163. mbaker@hbs.edu. 617-495-6566. Jeffrey Wurgler, NYU Stern School of Business, Suite 9-190, New York University, 44 West 4th Street, New York, NY 10012. jwurgler@stern.nyu.edu. 212-998-0367. Yu Yuan, The University of Iowa, Department of Finance, S276 Pappajohn Business Bldg, Iowa City, IA 55242-1000. Yu-Yuan@uiowa.edu. 319-335-0911. We thank Alexander Ljungqvist, Jay Ritter, and EUROFIDAI for providing data. We thank Rob Engle, Karen Lewis, and seminar participants of the Volatility Institute at NYU Stern for helpful comments. Baker gratefully acknowledges financial support from the Division of Research of the Harvard Business School, and Yuan gratefully acknowledges financial support from the Weiss Center for International Financial Research. The views in this paper are those of the authors and do not necessarily reflect the views of the Federal Reserve Bank of Dallas or the Federal Reserve System.

1 Introduction

The global stock market crash of 2007 and 2008 was extraordinary. The MSCI World Index of developed markets fell roughly 50 percent in dollar terms. Emerging markets fell further, with the MSCI Emerging Markets Index falling 66 percent from peak to trough. China's market index dropped 71 percent in dollar terms, following warnings of a stock market bubble by such authorities as Warren Buffett, Alan Greenspan, and even local Chinese regulators.

This paper explores how both global and local investor sentiment affect major stock markets. We also investigate whether and how sentiment spreads across markets. In the context of the most recent crash, our investigation addresses the question of whether the housing and banking crises actually did cause the present value of corporate payouts to fall by half in most countries, and by even more in emerging markets, or instead whether part of these returns may reflect shifts in sentiment distinct from economic fundamentals. That is, to the extent that optimism led stocks to be overvalued before the crash, pessimism led them to be undervalued after, or both, large crashes may be explained by somewhat less catastrophic (and perhaps more plausible) declines in global profitability.

We construct quantitative sentiment indexes for six stock markets: Canada, France, Germany, Japan, the United Kingdom, and the United States. We construct indexes of "total" investor sentiment for each country by forming the first principal component of several time series proxies for sentiment. We decompose the six total sentiment indices into a single "global" index and six "local" indices. The data are annual from 1980 to 2005 and drawn from several international sources. Sentiment is intrinsically difficult to measure precisely, so we begin with an index validation test based on dual-listed shares, i.e. Siamese twins. These are pairs of securities that have equal cash flow claims but trade in different markets and sometimes at substantially different prices.

We document that twins' relative prices are positively related to the relative local sentiment indexes of their respective markets. This is a relatively clean experiment that supports the empirical validity of our indexes. We then ask how sentiment affects stock markets more broadly. The basic supposition is that if sentiment drives prices too far, we may observe corrections in the form of return predictability. We start with regressions to predict market returns. We pool six markets together for power in our short sample. Total sentiment is a contrarian predictor of country-level market returns. The effect of total sentiment derives from approximately equal contributions from global and local components; each contain distinct and statistically significant predictive power. These results are similar for both value- and equal-weighted market returns.

Next we consider the effect of sentiment on the time-series of cross-sectional returns. Baker and Wurgler (2006, 2007) predict that broad waves of sentiment will have greater effects on hard to arbitrage and hard to value stocks; these stocks will exhibit high "sentiment beta." Confirming this, we find that when a country's total sentiment is high, future returns are relatively low for its small, high return volatility, growth, and distressed stocks. This extends prior US evidence to international markets. Furthermore, as with the time series results, this predictability derives both from global and local components of sentiment.

Our final investigation considers whether sentiment is contagious across countries. We use the absolute value of US capital flows with the other five sample countries to obtain cross-sectional variation in the extent of integration between these markets. We find that not only do local and global sentiment predict the cross-section of those countries returns, but so does US sentiment in those countries linked with the US by significant capital flows. While much more research can be done along these lines, this result suggests that capital flows represent one mechanism by which global sentiment develops and propagates.

Our study contributes to an emerging literature studying the role of investor sentiment in both corporate financing and asset pricing. In addition to the papers mentioned above, Brown and Cliff (2004), Lemmon and Portnaiguina (2006), Qiu and Welch (2004), and other papers have investigated the role of investor sentiment in US stock market returns. Yu and Yuan (2009) argue that sentiment has major effects on the mean-variance relationship in the stock market, with the tradeoff between risk and expected return emerging only in low sentiment periods. Baker and Wurgler (2008) investigate how it affects, and connects, the cross-section of stock returns and government bond returns while Bekart, Baele, and Inghelbrecht (2008) discuss sentiment and the time-series relationships between government bond and stock market returns. Baker and Wurgler (2000) regard sentiment as affecting aggregate financing patterns.

Section 2 explains the method of construction of the sentiment indexes. Section 3 reports the results of the validation test. Section 4 uses sentiment to predict the time series of market returns, and Section 5 considers the time series of the cross-section of returns. Section 6 examines sentiment contagion. Section 7 concludes.

2 Total, global, and local sentiment indexes

2.1 Basic empirical approach

We employ a strategy for measuring international markets sentiment that is similar to Baker and Wurgler's (2006) strategy for US sentiment. Their general approach takes as given that there is no perfect index of investor sentiment. Instead, there are a number of available, imperfect sentiment proxies that are likely to contain some component of investor sentiment along with a degree of non-sentiment, idiosyncratic variation. The common sentiment component is then estimated as the first principal component of the proxies.

Here, we are constrained by the availability of international sentiment proxies. We use the same set of proxies for all markets although an argument could be made that the principal components methodology should tolerate different proxies for different markets. One proxy is a quantity that we refer to as the volatility premium and simply identifies times when valuations on high-volatility stocks are high or low relative to valuations on low volatility stocks. This is by analogy to Baker and Wurglers use of the dividend premium, which as the relative valuation of dividend- and non-dividend-paying stocks is highly inversely related to the volatility premium. We can't form the dividend premium in some markets because dividends are relatively uncommon and, perhaps related, dividends do not appear to be viewed by local investors as connoting "stability" in the way they do among US investors.

The second and third proxies we employ are derived from IPO data. They involve the total volume of IPOs and their initial returns (often called underpricing). Extremely low long-run returns to IPOs have been noted by Stigler (1964), Ritter (1991), and Loughran, Ritter, and Rydkvist (1994), highly suggestive of successful market timing relative to a market index; subsequent work has shown that equity issues forecast low market returns as well. Regarding the use of initial returns on IPOs, it is again often noted that they increase in "hot" markets, for example, average first-day returns on US IPOs approached a remarkable 70% at the peak of the Internet bubble.

The fourth proxy we employ is market turnover. Baker and Stein (2004) point out that when shorting is relatively costly, sentimental investors are more likely to trade (and add liquidity) when they are optimistic. Sheinkman and Xiong (2003) provide a complementary argument for using turnover as a proxy for sentiment. So, as with the other three measures, we expect a positive relationship between the observed proxy and underlying sentiment.

2.2 Sentiment proxy data and definitions

The data sources used to form our sentiment proxies are summarized in Table 1 and summary statistics are given country by country in Table 2. The volatility premium ($PVOL$) is the year-end log of the ratio of the value-weighted average market-to-book ratio of high volatility stocks to that of low volatility stocks. High (low) volatility denotes one of the top (bottom) three deciles of the variance of the previous year's monthly returns, where decile breakpoints are determined country by country. This variable was available for the full sample. Its cross-country mean of approximately 0.50 denotes that the market-to-book ratio of high volatility stocks has on average been slightly higher than that of low volatility stocks, but in each country this relationship has occasionally been reversed.

The number of IPOs ($NIPO$) is the log of the total number of IPOs that year. The initial returns on IPOs ($RIPO$) represents the average initial (typically, first-day) return on that year's offerings. The returns are equal-weighted across firms. Both variables were available for all countries.[1] In US, the annual number of IPOs has ranged from 64 from 953 in the sample period (exponentiating the Min and Max values from Table 2), and the average initial return on IPOs has ranged from around 7% to 53%. Most other countries have also experienced wide variations in these quantities over time.

Market turnover ($TURN$) is the log of total market turnover, i.e. total dollar volume over the year divided by total capitalization at the end of the prior year. We detrend this with an up-to-five year moving average. We were able to obtain market-

[1] In our sample period from 1980 to 2005, French IPO data was not available for 1980 through 1982, and Germany data was not available for 2003 through 2005.

level turnover statistics for all markets except Germany. All markets except Japan display a positive trend in turnover in the sample period.[2]

2.3 Total sentiment indexes

The total sentiment index coefficients for each country are reported in the loadings column of Table 2. The index coefficients are estimated using the first principal component of each of the sentiment proxies, all measured contemporaneously. The resulting indexes are linear functions of the within-country standardized values of the proxies and thus have mean zero:

$$\begin{aligned}
SENT(Total, Canada, t) &= 0.37PVOL(t) + 0.16NIPO(t) + 0.44RIPO(t) + 0.39TURN(t) \\
SENT(Total, France, t) &= -0.03PVOL(t) + 0.41NIPO(t) + 0.35RIPO(t) + 0.47TURN(t) \\
SENT(Total, Germany, t) &= 0.13PVOL(t) + 0.52NIPO(t) + 0.52RIPO(t) \\
SENT(Total, Japan, t) &= 0.40PVOL(t) + 0.16NIPO(t) + 0.43RIPO(t) + 0.37TURN(t) \\
SENT(Total, UK, t) &= 0.39PVOL(t) + 0.23NIPO(t) + 0.33RIPO(t) + 0.35TURN(t) \\
SENT(Total, US, t) &= 0.36PVOL(t) + 0.31NIPO(t) + 0.32RIPO(t) + 0.35TURN(t)
\end{aligned}$$

where the country subscripts on the proxies have been suppressed. French IPO data was not available for 1980 through 1982, however, so to keep these data points we project the French sentiment values during 1980 through 1982 by the linear combination of the contemporaneous sentiment values of Canada, Japan, UK, and US. Similarly, German data for 2003 through 2005 is filled.

With only one exception, the sentiment proxies enter positively into the total indexes. The exception is the volatility premium in France, which is not positively correlated with the other proxies (-0.12 with $RIPO$ and -0.17 with $TURN$). The

[2]For Canada, France, and US, the data are obtained from the single source. However, for Japan and UK, the data from two different sources have to be combined to provide long series from 1980 to 2005. To make the series from different sources consistent, we adjust the later series to have the same standard deviations with the early series in the overlapping periods, by multiplying the later series by a constant. Hence, some Japan and UK numbers may not present the actual detrended log turnover, but the whole series consistently exhibit the turnover variations in the two countries.

least-positive coefficient is the volatility premium in Germany's index, which is the consequence of the unusually high correlation between the IPO-based proxies. The two proxies that are robustly important across all countries are $RIPO$ and $TURN$.

We standardize the total sentiment indexes defined above and plot them in Figure 1. The Internet bubble of the late 1990s, and its subsequent crash, is clearly represented not only in the US but in at least three other countries. These results serve as a reminder that Germany's Neuer Markt, France's Nouveau Marche, and London's TECHMark–only the last of which still exists–were overseas cousins of the more familiar Nasdaq in both composition and performance.[3] Another common feature appears to be a dip in the early 1990s.

2.4 Global and local sentiment indexes

We separate the total sentiment indexes into one global and six local components. The global index is the first principal component of the six total indexes. The loadings are reported in Table 3:

$$\begin{aligned} SENT(Global, t) = \quad & 0.21 SENT(Total, Canada, t) + 0.21 SENT(Total, France, t) \\ & + 0.25 SENT(Total, Germany, t) + 0.22 SENT(Total, Japan, t) \\ & + 0.27 SENT(Total, UK, t) + 0.27 SENT(Total, US, t) \end{aligned}$$

The US is widely considered the world's bellwether market. Consistent with this, the US total sentiment index exhibits a high degree of commonality with other countries' indexes and so it receives a high loading in the global index (at 0.27, it is tied with the UK).

The standardized version of the global index is plotted in Figure 2. Not surpris-

[3] Other examples include the Italian Nuovo Mercato, the Nordic New Market, and approximately ten other European markets that opened between 1996 and 2001.

ingly, the figure indicates that global sentiment rose steadily through the mid-1990s, peaked in 1999 and 2000, and then dropped by a few standard deviations within three years. Before entering the Internet bubble, global sentiment had declined from the late 1980s to the early 1990s.

Local indexes are defined as the components of the total indexes orthogonal to the global index. That is, we regress the total sentiment indexes on the global index in every country respectively and define local indexes as the residuals. We standardize these and plot them in Figure 2.

Needless to say, qualitative interpretations of any of the indexes involve a considerable degree of conjecture, and this may be most true of the local indexes. Nonetheless a few remarks on the US local index may be useful. The index reaches high levels in the early 1980s, perhaps reflecting speculative activity in biotech and natural resources shares that was concentrated in the US. The index declines somewhat following the 1987 crash. Perhaps because the technological advances of the Internet were concentrated in the US, the local index suggests that the sentiment associated with the bubble may have materialized there (and in Canada) first. Interestingly, while US total sentiment was high at the Internet's peak, it was not uniquely high relative to other countries in the sample. However, US-specific sentiment did decline to an unusual degree with the crash, probably reflecting the combination of the crash and the terrorist attacks against the US on September 11, 2001.

3 Validation with Siamese twins

3.1 The Siamese twins

Dual-listed companies, often termed "Siamese twins," provide a good laboratory in which to test the validity of our indexes. A twin pair comprises two companies which are incorporated in different countries and whose shares trade locally in those countries but, frequently as a result of a merger, have contractually agreed to operate their business as one and divide its cash flows to shareholders in a fixed ratio. The pair of Royal Dutch and Shell Transport is still the best-known example, despite their recent unification.

As documented by Rosenthal and Young (1990), Froot and Dabora (1999), and De Jong, Rosenthal, and Van Dijk (2008), the Siamese twins generally trade at prices that differ from the fixed cash flow ratio, sometimes by considerable amounts. Froot and Dabora provide the most comprehensive examination of why these price gaps occur. They consider six explanations but conclude that none of them is valid.[4] One residual explanation that they and others have proposed, but heretofore have been unable to test, is that twins' relative prices are influenced by market-specific sentiment shocks.[5]

With our putative sentiment measures, we are able to examine this explanation directly. To the extent that it is borne out in the data, it lends support to the joint hypothesis that our sentiment indexes are valid and that the drivers of the Siamese twins' price gaps include local sentiment.

3.2 Data and results

We obtain data on the relative prices of all current or recent Siamese twin pairs from 1981 through 2002 from Mathias Van Dijk at http://mathijsavandijk.com/dual-listed-companies. We can use only the subset in which at least one twin trades in a

[4]They consider explanations based on "discretionary uses of dividend income by parent companies; differences in parent expenditures; voting rights issues; currency fluctuations; ex-dividend-date timing issues; and tax-induced investor heterogeneity. Only that latter hypothesis can explain some (but not all) of the facts."

[5]De Jong et al. find that twins arbitrage strategies appear to present a large amount of noise trader (i.e. sentiment) risk as in De Long, Shleifer, Summers, and Waldmann (1990). But they also are unable to directly test a sentiment explanation directly.

market we study. Three sets of twins have both companies in our sample markets and provide 51 annual observations. These three pairs all involve the US and the UK.[6] Six more sets of twins have one company in our sample markets and provide 23 additional observations. Including them allows us to study a twin pair that involves France as well.[7]

We take annual observations on the year-end log price ratio, appropriately scaled such that a value of 0 represents theoretical parity, and regress the price deviation across the two countries on the year-end difference between investor sentiment:

$$log(\frac{P_{1,t}}{P_{2,t}}) \quad = a + b(SENT^*_{1,t} - SENT^*_{2,t}) + c\ log(\frac{P_{1,t-1}}{P_{2,t-1}}) + u_t$$

where $SENT^*$ alternately means total sentiment or local sentiment. In the sample that includes twins with only one company present in our sample markets, we set $SENT^*_2$ to zero. We control for the lagged relative price level because the dependent variable is empirically quite persistent; because the sentiment indexes are not measured without error; and because both sentiment indexes have been standardized, removing any differences in means (or scales).

Table 4 shows that the relative level of investor sentiment is significantly related to the relative level of twins' prices. The magnitude of the coefficient is highly statistically significant and reasonably important.[8] In Panel A, the standard deviation of the log price ratio is 9.3%, while the standard deviation of the total sentiment gap is 0.95, so a one-standard deviation change in the latter is associated with a change in

[6] Royal Dutch (US) and Shell Transport (UK) from 1981 through 2002; Smithkline Beecham H shares (US) and Smithkline Beecham E shares (UK) from 1990 through 1996; and Unilever NV (US) and Unilever PLC (UK) from 1981 through 2002.

[7] BHP Billiton PLC (UK and Australia) for 2002; Brambles Industries (UK and Australia) for 2002; Dexia (France and Belgium) for 1997 through 1999; Elsevier (UK) and Reed International (Netherlands) for 1994 through 2002; Rio Tinto Ltd (UK) and Rio Tinto PLC (AU) for 1996 through 2002; and Allied Zurich (UK) and Zurich Allied (Switzerland) for 1999 and 2000.

[8] The Newey-West Standard deviation is used to calculate p value, to adjust the autocorrelations in residuals.

the log price ratio of $1.61 \times 0.95 = 1.53\%$ or approximately one-sixth of a standard deviation.

In Table 4, we use both total and local measures of sentiment. Recall that local sentiment is total sentiment less global sentiment times a loading on global sentiment that varies by country. For this reason the difference between two countries measures of local sentiment is not the same as the difference between the same countries measures of total sentiment. The gap between these two differences reflects a differential sensitivity to global sentiment. This extra difference in total sentiment measures arguably has an impact on the differential pricing. Indeed, the results are slightly stronger when we focus on total sentiment differences in Table 4.

This experiment provides some validation of our international sentiment index measures. This complements US-based studies that have previously argued from a variety of perspectives that sentiment is present in the individual proxies that we employ. As an aside, the results here also represent a finding of significant interest in itself with respect to understanding the Siamese twins phenomenon.

4 Sentiment and market-level returns

4.1 Prior evidence and market-level data

In the Introduction we suggested that investor sentiment may have played a role in the recent global crash. Other speculative episodes often mentioned with at least oblique reference to sentiment include the rise in US share values in the late 1920s, the subsequent crash in 1929, and depressed values through the mid 1930s; the October 1987 crash that Cutler, Poterba, and Summers (1989) cannot connect to significant fundamental news; the Internet bubble and crash of the late 1990s and early 2000s for which many have argued the same; the previously noted Chinese market bubble of the mid-2000s and the global crash in stock markets of 2007 and 2008 (which remains relatively unstudied in this context). Baker and Wurgler (2006) review other anecdotes involving US (total) investor sentiment from the early 1960s through the mid 2000s.

The empirical literature has employed sentiment proxies and indexes as contrarian market-level return predictors only sporadically and mainly in the US context. Kothari and Shanken (1997) discuss the predictability of the aggregate book-to-market ratio for annual US market returns. The argue for a sentiment-type explanation at least around the Great Crash based on evidence of predictably negative risk premia, strong evidence against market efficiency since rational risk premia must be positive. Baker and Wurgler (2000) adopt this approach using the equity share in total equity and debt issues and find results consistent with Kothari and Shanken. Tests of based on returns Henderson, Jegadeesh, and Weisbach (2006) extend the predictability evidence to international markets. Baker and Wurgler (2007) find some evidence that an index similar to that estimated here predicts market-level US returns, and Brown and Cliff (2004) also consider US market returns but do not find evidence of predictability.

Returns for one market obviously have less power to reject the null of no market return predictability than returns for a panel of six countries (Ang and Bekaert (2007) discuss this further), although due to cross-correlation this amounts to fewer than six independent observations per period. In this paper, we collect monthly market return data from Datastream, which cover the stocks from the largest exchange in a country except US.[9]

[9]For US, Datastream covers the stocks from NYSE, AMEX, and Nasdaq.

4.2 Predictability of market return

We pool monthly returns from 1981-2006 for our countries and regress the monthly returns over the calendar years on beginning-of-year investor sentiment index values:

$$
\begin{aligned}
R_{MKT,t} &= a + dSENT_{t-1}^{Total} + u_t \\
R_{MKT,t} &= b + eSENT_{t-1}^{Global} + fSENT_{t-1}^{Local} + u_t
\end{aligned}
$$

Due to the cross-correlation in returns our significance tests are based on month-clustered standard errors.

Table 5 shows that across these six markets, total investor sentiment serves as a statistically significant contrarian predictor of market returns. The economic significance of the predictability is rather large. All sentiment indexes are standardized; a one-standard-deviation increase in a country's total investor sentiment index is associated with value-weighted (equal-weighted) market returns that are lower by 5.0 (6.4) percentage points over the coming year. The marginally stronger effect for equal-weighted returns presumably comes about because small stocks tend to be harder to value (due to spottier information) and to arbitrage (due to generally greater costs and risks). This logic is developed a bit further in the next section, which focuses solely on cross-sectional tests. Excluding the US, which is useful because sentiment has been most extensively studied in that market, leaves the results essentially unchanged.

Interestingly, these results are driven independently by global and local sentiment. The point estimates suggest that global sentiment is marginally more important than local sentiment, but not by a statistically significant amount. As a first approximation we can regard their contributions to market-level predictive regressions as essentially equal. Again, excluding the US leaves these results unchanged. Overall, Table 5 represents new and fairly strong evidence that sentiment affects markets around the world.

5 Sentiment and cross-section of returns

5.1 Prior evidence and firm-level data

The dimension of predictability that Baker and Wurgler (2006) focus on and Brown and Cliff (2004) and Lemmon and Portniaguina (2006) also investigate is how the level of US total sentiment affects the cross-section of predicted returns. Brown and Cliff find little support for this prediction using their various sentiment measures, while Lemmon and Portniaguina find stronger evidence of sentiment as a contrarian predictor of small stocks and low institutional ownership stocks but not value or momentum portfolios. Qui and Welch (2007) also use sentiment to predict small stocks.[10]

Baker and Wurgler find robust predictability of the time series of the cross-section using a US index similar to that used here. Relative to prior work, their sentiment proxies may be more informative and/or the predictions that they test may be sharper. First, they observe that sentiment should have relatively stronger effects on stocks that are "hard to arbitrage"; those that arbitrageurs find relatively costly or risky to trade against mispricings. This leads such stocks' aggregate demand curves to be more downward sloping and thus their prices more sensitive to sentiment-driven demand shifts.[11] Second and slightly more novel, they argue that sentiment should

[10] A few of these papers use consumer confidence as a sentiment index, but it is somewhat ambiguous whether its power comes from true sentiment or through some connection to economic fundamentals. Consumer confidence predicts consumer buying, which translates into corporate profitability in a fundamental respect. The indexes constructed here are also quite imperfect but suffer less from this particular problem.

[11] For example, liquidity risk as in Acharya and Pedersen (2005); arbitrage risk in Wurgler and Zhuravskaya (2000); transaction costs and asymmetric information as in Amihud and Mendelson (1986); predatory trading risk as in Brunnermeier and Pedersen (2004); noise trader risk as in De

have relatively stronger effects on stocks that are "hard (highly subjective) to value." Both extremely high or low valuations on such stocks can be plausibly defended by sentimental investors, as befits their current sentiment.

The basic empirical prediction of all this is that sentiment may serve as a contrarian predictor of "high sentiment beta" portfolios. Conveniently, several key stock portfolios are classifiable as either relatively easy to arbitrage and easy to value or as relatively hard to arbitrage and hard to value, making this prediction straightforward to test.[12] Examples of stock portfolios with high sentiment beta characteristics are small, high volatility, non-dividend paying, unprofitable, distressed, or extreme growth portfolios; their complement portfolios are lower, even perhaps negative sentiment beta.

One empirical subtlety involves how to capture growth and distress characteristics using value or sales growth portfolios. Baker and Wurgler predict and find evidence that the effects of sentiment on these portfolios are roughly U-shaped. Very high book-to-market or very low (negative) sales growth can be associated with distress; very low book-to-market can be associated with extreme growth, as is very high sales growth. In other words, when sorting stocks along value or sales growth dimensions, high sentiment beta stocks commonly reside in the extreme high and low deciles where staid, low sentiment beta stocks are typically found in the middle. We account for this U-shape in our tests involving these portfolios.[13]

Our cross-sectional portfolios are formed based on four firm or stock characteristics that are easy to gather for our markets: firm size, total risk, book-to-market ratio, and sales growth. Returns and market capitalization are obtained from Datastream.

Long et al. (1990); and short-selling costs as in D'Avolio (2002), Duffie, Garleanu, and Pedersen (2002), Geczy, Musto, and Reed (2002), and Ofek and Richardson (2002);

[12]Notably, momentum doesn't fall clearly in either set, likely explaining why sentiment has not been a successful predictor of such portfolios.

[13]Not accounting for this nonmonotonicity in sentiment beta explains why some prior research found no clear connection between sentiment and value portfolios.

Book values and annual sales are downloaded from Worldscope. Total risk is the volatility of monthly total returns over the prior year. Decile breakpoints vary by country-year.

5.2 Predicting the time series of the cross-section

Simple two-way sorts are presented in Tables 6 and 7. We sort stocks across years according to whether the level of their total sentiment index is positive or negative. The basic predictions are borne out. High sentiment periods are associated with 1.59 percentage point lower monthly returns on top-decile volatility stocks than low sentiment periods. Cumulated across twelve months, this is a quite large effect. High sentiment periods also portend 1.16 lower returns on the bottom capitalization decile portfolio, also a large effect. As expected, the effect of sentiment is much smaller on low volatility stocks or large stocks.

As mentioned above, we predict a somewhat U-shaped effect of sentiment on book-to-market and sales growth portfolios. This is borne out reasonably well in both types of portfolios, but more strongly in the sales growth portfolios. There, high sentiment periods forecast 95 basis points lower monthly returns on bottom-decile sales growth portfolios and 1.06 percentage points lower returns on top-decile portfolios. This contrasts with high sentiment forecasting only 55 to 62 basis points lower monthly returns on middle-decile sales growth portfolios, expected to contain lower sentiment beta stocks in this particular sort. Cumulated over the year, the differences between the extreme and middle deciles are of meaningful magnitude, though not as strong as the volatility and capitalization results.

Table 7 repeats these sorts for the five markets excluding the US market. The results indicate effects of very similar economic significance.

Next we move to time series regressions to predict long-short portfolios. This provides a simpler setting in which to conduct hypothesis tests and also allows us to look at the separate effects of global and local sentiment. The basic regression models are:

$$
\begin{aligned}
R_{X_{it}=long,t} - R_{X_{it}=short,t} &= a + dSENT_{t-1}^{Total} + u_t \\
R_{X_{it}=long,t} - R_{X_{it}=short,t} &= b + eSENT_{t-1}^{Global} + fSENT_{t-1}^{Local} + u_t
\end{aligned}
$$

Again the significance tests incorporate month-clustered standard errors.

The results for the total sentiment column in Table 8 are consistent with those from the sorts. In five out of six hypothesis tests, the effect of total sentiment is statistically significant and the remaining long-short portfolio, which sorts on distress by using high value against medium value, is of the expected sign and significant at the 20% level (10% in a one-sided test, which is arguably more appropriate). Some calculation will confirm that the economic significance of the effects implied by these estimates is similar to that from the sorts in prior tables, with the effects for the volatility portfolios again being particularly large. This is consistent with the intuition that sorting on volatility leads to particularly clear contrasts on both arbitrage risk and valuation ambiguity dimensions.

We also test for the effects of global versus local sentiment in Table 8. For size and volatility portfolios, the results show that both types of sentiment affect the cross-section of returns. The economic effects for the volatility portfolios are, once again, particularly large. In every case the predictability is of the hypothesized expected sign. Similar to our time-series results, there is no consistent pattern in whether global or local sentiment is more economically or statistically significant for cross-sectional portfolios. Global sentiment is statistically significant at the 10% level in two of six portfolios in two-sided tests, and five out of six in one-sided tests. Local sentiment is significant at the 10% level in four out of six in two-sided tests and five out of six in one-sided tests.

We conclude from this evidence that total sentiment plays a nontrivial role in determining cross-sectional return characteristics in major international markets. This extends prior evidence from the US market. Furthermore, and more interesting, both global and local components of investor sentiment play a role in the cross-section of returns.

6 Sentiment contagion

Our results suggest that both global and local sentiment affect stock prices. When global and local sentiment are high, future local stock returns are low, and particularly so for small and volatile stocks, and those that are at both ends of the spectrum of growth and distress. The local sentiment effects extend the evidence from the US on sentiment and the cross section of stock returns. The effect of global sentiment suggests a more novel mechanism. In particular, sentiment from one country may be contagious.

There are two sources of contagion. One possibility is that investors in one country are optimistic about investment prospects in another, bidding up the shares of that particular country. This sort of sentiment, using our measures, will be captured by local sentiment. Local sentiment rises with the local volatility premium, the local number of IPOs, the local first day return on IPOs, and the local rate of share turnover. These are local measures, but they reflect capital market activity, which in principle can come from foreign as well as local investors. The evidence in Klibanov, Lamont, and Wizman (1998) and Hwang (2009), who examine the pricing of closed-end funds, are suggestive of this channel.

Another possibility is that investors in one country - say the US - are simply optimistic and this leads to a shift into risky assets more broadly, including international equities. US sentiment will then affect prices in another target country, above and beyond local sentiment, provided that our measure of local sentiment is not absolutely complete, as it surely is not, and provided that there is a robust flow of private capital from the US into the target. We test this hypothesis in Table 9. We regress future returns of size, volatility, growth, and distress portfolios in the five countries excluding US on lagged sentiment in the local country as before. But, we now include US sentiment, and importantly US sentiment interacted with capital flows from the US to each of the five other countries.

$$\begin{aligned} R_{X_{it}=high,t} - R_{X_{it}=low,t} = \quad & a + bSENT^{Total}_{t-1} + cSENT^{Total,US}_{t-1} + d|Flow_{t-1}| \\ & + eSENT^{Total,US}_{t-1} \times |Flow_{t-1}| + u_t \end{aligned}$$

The data on capital flows come from US Treasury Bulletin and are normalized by the market value of the foreign stock market. In every case where the effect of sentiment of the local country is statistically significant, there is also a strong and conditional effect of US sentiment. Provided the capital flows between the US and Canada, to take an example, are high, then US sentiment has the same effect on hard-to-value and difficult-to-arbitrage Canadian stocks as Canadian sentiment. This suggests that sentiment is contagious. When US investors have high sentiment, this spreads to other countries through private capital flows.

7 Conclusion and implications

This paper makes four main contributions. The first is to construct practical indexes of investor sentiment for six major stock markets and global markets as a whole. We construct sentiment indexes for Canada, France, Germany, Japan, the United

Kingdom, and the United States, and from these total sentiment indexes we extract one global and six local, or country-specific, indexes. Importantly, we validate these indexes, to the extent we are able to do so, by successfully relating them to Siamese twins share prices.

The second and third contributions of the paper are to test whether investor sentiment affects the time series of international market-level returns as well as the time series of the cross-section of international stock returns. We find that sentimentboth global and localis a statistically and economically significant contrarian predictor of market returns as well as the relative returns on high-sentiment-beta stocks. The high-sentiment-beta portfolios that we consider are small, high volatility, distressed, and growth portfolios. In a sense, all of these results are consistent with theoretical predictions, so they further validate the indexes.

Our fourth contribution is to investigate of how global sentiment emerges and propagates. We find evidence that it emerges at least in part because sentiment is contagious across markets, and at least one of the mechanisms at play is international capital flows. Ours is a simple investigation of the contagion question; we believe there is considerable scope for further research.

We return to the events introduced at the beginning of this paper: the recent, devastating global stock market crash. Although this occurred too recently to be included in our sample, our results may contain at least slightly optimistic messages. As sentiment has played a significant role in past bubbles and crashes, there is reason to harbor hope that expected global cash flows have not declined by one half, but rather markets have overshot the decline justified by a rational look at fundamentals. Alternatively, current valuation levels may be justified but prior levels may have been inflated by sentiment. This interpretation is less consoling in terms of the outlook for future returns.

In any event, this event has stimulated an important discussion in economic policy circles, including at the Federal Reserve, about whether bubbles should be ex ante identified and managed. Measuring and understanding the dynamics of investor sentiment is the first step in answering these policy questions.

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Table 1: Data Resources

Country	Item	Period	Data Source
Panel A. Volatility Premium ($PVOL$)			
All countries	Stock return	1980-2005	Datastream (http://www.datastream.com/default.htm)
	Market value	1980-2005	Datastream
	Book value	1980-2005	Worldscope (http://www.thomsonreuters.com/)
Panel B. IPO Volume ($NIPO$)			
Japan, UK, and US	$NIPO$	1980-2005	The updated version of Loughran, et al. (1994) (http://bear.cba.ufl.edu/ritter/Int2008.pdf)
Canada	$NIPO$	1980-1983	From Jog and Riding through the updated version of Loughran, et al. (1994)
	$NIPO$	1984-1991	From Jog and Srivastava through the updated version of Loughran, et al. (1994)
	$NIPO$	1992-2005	The updated version of Loughran, et al. (1994)
France	$NIPO$	1983-2005	The updated version of Loughran, et al. (1994)
Germany	$NIPO$	1980-2002	From Ljungqvist
Panel C. IPO First-day Returns ($RIPO$)			
Japan, UK, and US	$RIPO$	1980-2005	The updated version of Loughran, et al. (1994)
Canada	$RIPO$	1980-1983	From Jog and Riding through the updated version of Loughran, et al. (1994)
	$RIPO$	1984-1991	From Jog and Srivastava through the updated version of Loughran, et al. (1994)
	$RIPO$	1992-2005	The updated version of Loughran, et al. (1994)
France	$RIPO$	1983-1998	The updated version of Loughran, et al. (1994)
	$RIPO$	1999-2005	From Dealogic through the updated version of Loughran, et al. (1994)
Germany	$RIPO$	1980-2002	From Ljungqvist

Table 1: Data Resources, Continued

Country	Item	Period	Data Source
Panel D. Turnover ($TURN$)			
Canada, UK, and US	Dollar volume	1980-2005	Datastream
France	Dollar volume	1980-2005	EUROFIDAI (http://www.eurofidai.org/)
Japan	Dollar volume	1980-1989	Global Financial Data (https://www.globalfinancialdata.com/)
	Dollar volume	1990-2005	Datastream
Canada, Japan, UK, and US	Market value	1980-2005	Datastream
France	Market value	1980-2005	EUROFIDAI

Data resources for raw measures of investor sentiment from 1980 to 2005. The first measure ($PVOL$) is the year-end log ratio of the value-weighted average market-to-book ratios of high volatile stocks and low volatile stocks. The second measure ($NIPO$) is the log annual number of initial public offerings. The third measure ($RIPO$) is the average annual first-day returns of initial public offerings. The fourth measure ($TURN$) is detrended log turnover.

Table 2: Total Sentiment, 1980 to 2005

					Correlations with $SENT^{Total}$		Loadings	Correlations with Sentiment Components				P Values			
	Mean	SD	Min	Max	$SENT^{Total}$	P Value		$PVOL$	$NIPO$	$RIPO$	$TURN$	$PVOL$	$NIPO$	$RIPO$	$TURN$
Panel A. Canada															
$PVOL$	0.72	0.43	-0.01	1.60	0.74	(0.00)	0.37	1.00				(.)			
$NIPO$	2.70	0.83	1.61	4.26	0.31	(0.12)	0.16	0.06	1.00			(0.76)	(.)		
$RIPO$	0.07	0.06	-0.04	0.24	0.86	(0.00)	0.44	0.56	0.04	1.00		(0.00)	(0.86)	(.)	
$TURN$	0.21	0.30	-0.35	1.03	0.77	(0.00)	0.39	0.28	0.29	0.54	1.00	(0.17)	(0.15)	(0.00)	(.)
Panel B. France															
$PVOL$	0.11	0.55	-1.03	1.49	-0.06	(0.79)	-0.03	1.00				(.)			
$NIPO$	3.39	0.73	1.61	4.69	0.80	(0.00)	0.41	0.23	1.00			(0.29)	(.)		
$RIPO$	0.11	0.07	0.02	0.26	0.69	(0.00)	0.35	-0.12	0.26	1.00		(0.58)	(0.23)	(.)	
$TURN$	0.16	0.30	-0.59	0.62	0.92	(0.00)	0.47	-0.17	0.67	0.50	1.00	(0.43)	(0.00)	(0.02)	(.)
Panel C. Germany															
$PVOL$	0.52	0.61	-1.04	1.62	0.24	(0.28)	0.13	1.00				(.)			
$NIPO$	3.02	0.85	1.79	5.12	0.93	(0.00)	0.52	0.11	1.00			(0.60)	(.)		
$RIPO$	0.12	0.12	-0.00	0.43	0.92	(0.00)	0.52	0.08	0.75	1.00		(0.71)	(0.00)	(.)	
Panel D. Japan															
$PVOL$	0.54	0.63	-0.36	2.04	0.79	(0.00)	0.40	1.00				(.)			
$NIPO$	4.34	0.73	2.64	5.14	0.32	(0.11)	0.16	0.14	1.00			(0.50)	(.)		
$RIPO$	0.31	0.22	0.07	0.86	0.85	(0.00)	0.43	0.61	0.02	1.00		(0.00)	(0.93)	(.)	
$TURN$	-0.05	1.97	-5.88	2.65	0.74	(0.00)	0.37	0.30	0.27	0.48	1.00	(0.14)	(0.19)	(0.01)	(.)

Table 2: Total Sentiment, Continued

					Correlations with $SENT^{Total}$		Loadings	Correlations with Sentiment Components				P Values			
	Mean	SD	Min	Max	$SENT^{Total}$	P Value		$PVOL$	$NIPO$	$RIPO$	$TURN$	$PVOL$	$NIPO$	$RIPO$	$TURN$
Panel E. UK															
$PVOL$	0.28	0.47	-0.53	1.55	0.88	(0.00)	0.39	1.00				(.)			
$NIPO$	4.41	0.69	2.56	5.43	0.53	(0.01)	0.23	0.28	1.00			(0.16)	(.)		
$RIPO$	0.16	0.12	0.06	0.61	0.75	(0.00)	0.33	0.64	0.15	1.00		(0.00)	(0.45)	(.)	
$TURN$	0.88	1.17	-0.81	3.63	0.80	(0.00)	0.35	0.60	0.37	0.37	1.00	(0.00)	(0.06)	(0.06)	(.)
Panel F. US															
$PVOL$	0.39	0.48	-1.04	1.81	0.80	(0.00)	0.36	1.00				(.)			
$NIPO$	5.83	0.75	4.16	6.86	0.68	(0.00)	0.31	0.41	1.00			(0.04)	(.)		
$RIPO$	0.17	0.11	0.07	0.53	0.70	(0.00)	0.32	0.55	0.14	1.00		(0.00)	(0.48)	(.)	
$TURN$	0.22	0.26	-0.28	0.68	0.78	(0.00)	0.35	0.40	0.52	0.40	1.00	(0.04)	(0.01)	(0.04)	(.)

Means, standard deviations, and correlations for measures of investor sentiment. The first measure ($PVOL$) is the year-end log ratio of the value-weighted average market-to-book ratios of high volatile stocks and low volatile stocks. The second measure ($NIPO$) is the log annual number of initial public offerings. The third measure ($RIPO$) is the average annual first-day returns of initial public offerings. The fourth measure ($TURN$) is detrended log turnover. $SENT^{Total}$, total sentiment, is the first principal component of the four measures within one country.

Table 3: Global and Local Sentiment, 1980 to 2005

Panel A: Total and Global Sentiment																
	Correlations with Global Sentiment		Loadings	Correlations Among Six Total Sentiments						P Values						
	$SENT^{Global}$	P Value		Canada	France	Germany	Japan	UK	US	Canada	France	Germany	Japan	UK	US
Canada	0.56	(0.00)	0.21	1.00						(.)					
France	0.61	(0.00)	0.21	0.03	1.00					(0.90)	(.)				
Germany	0.78	(0.00)	0.25	0.37	0.44	1.00				(0.06)	(0.02)	(.)			
Japan	0.59	(0.00)	0.22	0.10	0.29	0.15	1.00			(0.64)	(0.15)	(0.48)	(.)		
UK	0.77	(0.00)	0.27	0.23	0.39	0.48	0.71	1.00		(0.26)	(0.05)	(0.01)	(0.00)	(.)	
US	0.82	(0.00)	0.27	0.62	0.44	0.73	0.22	0.34	1.00	(0.00)	(0.03)	(0.00)	(0.27)	(0.08)	(.)

Panel B: Local Sentiment												
	Correlations Among Six Local Sentiments						P Values					
	Canada	France	Germany	Japan	UK	US	Canada	France	Germany	Japan	UK	US
Canada	1.00						(.)					
France	-0.48	1.00					(0.01)	(.)				
Germany	-0.13	-0.08	1.00				(0.53)	(0.71)	(.)			
Japan	-0.35	-0.11	-0.62	1.00			(0.08)	(0.61)	(0.00)	(.)		
UK	-0.38	-0.16	-0.30	0.50	1.00		(0.05)	(0.44)	(0.13)	(0.01)	(.)	
US	0.33	-0.14	0.25	-0.55	-0.78	1.00	(0.10)	(0.51)	(0.21)	(0.00)	(0.00)	(.)

Global sentiment ($SENT^{Global}$) is the first principal component of the six total sentiment indexes ($SENT^{Total}$) in Canada, France, Germany, Japan, UK, and US. Local sentiment ($SENT^{Local}$) is the orthogonal residual from the regression, $SENT^{Total} = b_i\ SENT^{Global} + SENT^{Local}$, within a country.

Table 4: Time Series Regressions for Siamese Twins

	N(Obs)	Constant	$SENT^{Total}_{1,t} - SENT^{Total}_{2,t}$ $\times 10^2$	$log(\frac{P_{1,t-1}}{P_{2,t-1}})$	R^2
Total Sentiment	51	0.01	**1.61**	0.77	72%
		[.05]	**[.03]**	[.00]	
Local Sentiment	51	0.01	**0.93**	0.77	70%
		[.05]	**[.05]**	[.00]	

$$log(\frac{P_{1,t}}{P_{2,t}}) \quad = a + b(SENT^{Total}_{1,t} - SENT^{Total}_{2,t}) + c\ log(\frac{P_{1,t-1}}{P_{2,t-1}}) + u_t$$

The dependent variable is the annual log deviation of the relative price of Siamese twins. The independent variables are the difference between total sentiment and the lagged log deviation. Panel A reports the results from the sample containing three twins, for which we have sentiment values for both countries. The sample in Panel B includes additional six twins, for which we only have sentiment values for one side. We assume the sentiment values on the other side as zeros. The Newey-West p values are in braces.

Table 5: Time Series Regressions for Country-Level Index Returns, 1981 to 2006

	$SENT^{Total}_{t-1}$			$SENT^{Global}_{t-1}$		$SENT^{Local}_{t-1}$		
	d	p(d)	R^2	e	p(e)	f	p(f)	R^2
Panel A. Including US								
VW	-0.33	[.08]	0.4%	-0.43	[.06]	-0.05	[.61]	0.6%
EW	-0.45	[.03]	0.7%	-0.51	[.02]	-0.17	[.20]	1.0%
Panel B. Excluding US								
VW	-0.33	[.10]	0.4%	-0.42	[.09]	-0.09	[.42]	0.6%
EW	-0.42	[.04]	0.6%	-0.50	[.05]	-0.17	[.22]	1.2%

$$R_{MKT,t} = a + dSENT^{Total}_{t-1} + u_t \quad (1)$$
$$R_{MKT,t} = b + eSENT^{Global}_{t-1} + fSENT^{Local}_{t-1} + u_t \quad (2)$$

Regressions of country-level value- and equal-weighted index returns on lagged $SENT^{Total}$ (in equation (1)), or on lagged $SENT^{Global}$ and lagged $SENT^{Local}$ (in equation (2)). In Panel A, the sample includes monthly country-level index returns from 1981 to 2006 in the six countries: Canada, France, Germany, Japan, UK, and US. In Panel B, the sample excludes US data. The first column shows the results from equation (1), and the second column shows the results from equation (2). Clustered p values are in braces.

Table 6: Two-way Sorts: Total Sentiment and Firm Characteristics, 1981 to 2006

	$SENT_{t-1}^{Total}$	Decile										Overall		
		1	2	3	4	5	6	7	8	9	10	$10-1$	$10-5$	$5-1$
σ	High	0.74	0.95	1.03	1.08	1.09	1.09	1.05	0.91	0.73	0.66	-0.08	-0.43	0.35
	Low	0.99	1.16	1.26	1.43	1.50	1.64	1.59	1.67	1.82	1.94	0.94	0.43	0.51
	Difference	-0.26	-0.21	-0.24	-0.35	-0.42	-0.55	-0.54	-0.76	-1.09	-1.28	-1.02	-0.86	-0.16
ME	High	1.99	1.40	1.02	0.80	0.79	0.77	0.77	0.74	0.79	0.84	-1.15	0.05	-1.20
	Low	2.67	1.99	1.68	1.55	1.48	1.37	1.28	1.32	1.27	1.31	-1.36	-0.17	-1.20
	Difference	-0.68	-0.59	-0.66	-0.74	-0.69	-0.61	-0.51	-0.58	-0.48	-0.47	0.21	0.22	0.00
BE/ME	High	0.88	0.84	0.79	0.89	0.96	0.99	1.06	1.15	1.27	1.56	0.68	0.60	0.08
	Low	1.92	1.58	1.51	1.54	1.45	1.56	1.53	1.51	1.60	2.03	0.11	0.58	-0.47
	Difference	-1.04	-0.74	-0.72	-0.66	-0.49	-0.57	-0.46	-0.36	-0.33	-0.47	0.57	0.01	0.56
GS	High	0.79	0.86	0.94	1.14	1.18	1.18	1.19	1.18	1.20	0.97	0.18	-0.20	0.39
	Low	1.44	1.43	1.51	1.43	1.53	1.64	1.77	1.71	1.77	2.04	0.60	0.51	0.09
	Difference	-0.65	-0.57	-0.57	-0.29	-0.36	-0.46	-0.58	-0.53	-0.56	-1.06	-0.42	-0.71	0.29

For each month, we form ten portfolios according to the total risk (σ), firm size (ME), book-to-market ratio (BE/ME), and sales growth (GS). We report equal-weighted portfolio returns over months where total sentiment ($SENT^{Total}$) from the previous year end is higher than within-country median, lower than within-country median, and the difference between the two averages. The sample includes monthly returns from 1981 to 2006 in the six countries: Canada, France, Germany, Japan, UK, and US.

Table 7: Two-way Sorts: Total Sentiment and Firm Characteristics, Excluding US, 1981 to 2006

	$SENT_{t-1}^{Total}$	Decile										Overall		
		1	2	3	4	5	6	7	8	9	10	10 − 1	10 − 5	5 − 1
σ	High	0.59	0.85	0.95	1.00	1.04	1.05	0.97	0.83	0.63	0.51	-0.08	-0.53	0.45
	Low	0.92	1.11	1.23	1.41	1.49	1.64	1.59	1.67	1.78	1.85	0.93	0.36	0.57
	Difference	-0.33	-0.26	-0.28	-0.41	-0.45	-0.59	-0.62	-0.84	-1.15	-1.34	-1.01	-0.89	-0.12
ME	High	1.79	1.39	0.94	0.77	0.73	0.70	0.69	0.66	0.74	0.79	-1.00	0.06	-1.06
	Low	2.56	1.86	1.65	1.53	1.47	1.38	1.28	1.32	1.26	1.32	-1.24	-0.15	-1.09
	Difference	-0.77	-0.47	-0.70	-0.76	-0.74	-0.68	-0.59	-0.66	-0.52	-0.53	0.24	0.21	0.03
BE/ME	High	0.87	0.82	0.73	0.84	0.90	0.91	0.98	1.07	1.17	1.45	0.57	0.55	0.03
	Low	1.99	1.61	1.53	1.54	1.46	1.55	1.50	1.46	1.52	1.92	-0.07	0.47	-0.54
	Difference	-1.12	-0.79	-0.80	-0.71	-0.55	-0.65	-0.52	-0.39	-0.36	-0.48	0.64	0.08	0.57
GS	High	0.67	0.73	0.85	1.08	1.12	1.10	1.10	1.12	1.20	0.99	0.32	-0.13	0.45
	Low	1.38	1.38	1.46	1.40	1.51	1.62	1.81	1.73	1.79	2.12	0.74	0.61	0.13
	Difference	-0.71	-0.64	-0.61	-0.31	-0.39	-0.52	-0.70	-0.61	-0.59	-1.13	-0.42	-0.74	0.32

For each month, we form ten portfolios according to the total risk (σ), firm size (ME), book-to-market ratio (BE/ME), and sales growth (GS). We report equal-weighted portfolio returns over months where total sentiment ($SENT^{Total}$) from the previous year end is higher than within-country median, lower than within-country median, and the difference between the two averages. The sample includes monthly returns from 1981 to 2006 in the five countries: Canada, France, Germany, Japan, and UK.

Table 8: Time Series Regressions for Cross-Sectional Returns, 1981 to 2006

		$SENT^{Total}_{t-1}$			$SENT^{Global}_{t-1}$		$SENT^{Local}_{t-1}$		
		d	p(d)	R^2	e	p(e)	f	p(f)	R^2
Panel A. Size and Risk									
ME	SMB	-0.29	[.01]	0.3%	-0.21	[.05]	-0.23	[.14]	0.4%
σ	High-Low	-0.72	[.00]	1.7%	-0.76	[.00]	-0.28	[.04]	2.1%
Panel B. Growth Opportunities									
BE/ME	Low-Medium	-0.27	[.02]	0.6%	-0.19	[.20]	-0.17	[.01]	0.6%
GS	High-Medium	-0.33	[.03]	1.1%	-0.22	[.18]	-0.21	[.03]	1.0%
Panel C. Distress									
BE/ME	High-Medium	-0.06	[.57]	0.1%	-0.14	[.30]	0.02	[.81]	0.3%
GS	Low-Medium	-0.17	[.11]	0.4%	-0.12	[.21]	-0.11	[.17]	0.3%

$$R_{X_{it}=long,t} - R_{X_{it}=short,t} = a + dSENT^{Total}_{t-1} + u_t \quad (1)$$
$$R_{X_{it}=long,t} - R_{X_{it}=short,t} = b + eSENT^{Global}_{t-1} + fSENT^{Local}_{t-1} + u_t \quad (2)$$

Regressions of long-short equal-weighted portfolio returns on lagged $SENT^{Total}$ (in equation (1)), or on lagged $SENT^{Global}$ and lagged $SENT^{Local}$ (in equation (2)). The first column shows the results from equation (1), and the second column shows the results from equation (2). The sample includes monthly returns from 1981 to 2006 in the six countries: Canada, France, Germany, Japan, UK, and US. The long-short portfolios are formed based on firm characteristics (X): firm size (ME), total risk (σ), book-to-market ratio (BE/ME), and sale growth (GS). High includes the top two deciles; low includes the bottom two deciles; medium includes the middle two deciles. Equal-weighted monthly returns are matched to $SENT^{Total}$, $SENT^{Global}$, or $SENT^{Local}$ from previous end. Clustered p values are in braces.

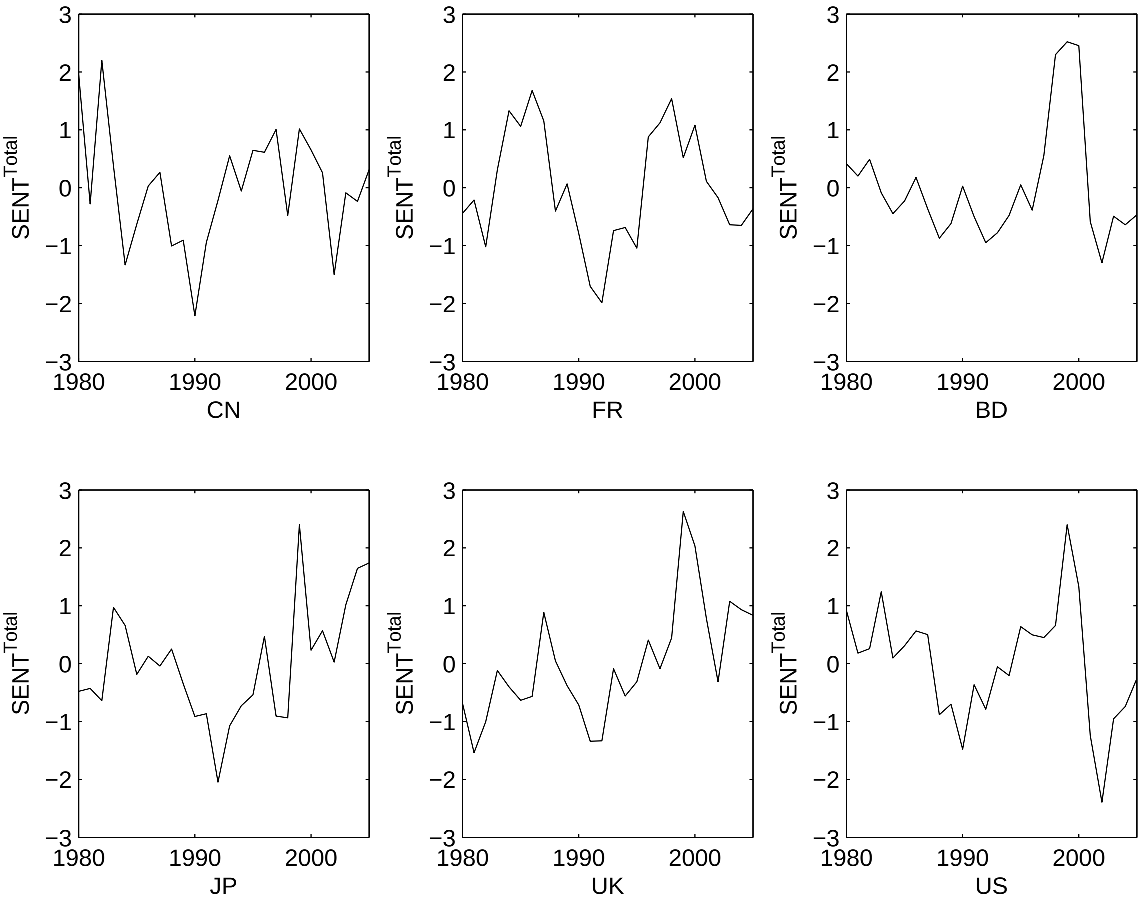
Table 9: Time Series Regressions for Sentiment Contagion, 1981 to 2006

		Constant	$SENT_{t-1}^{Total}$	$SENT_{t-1}^{US}$	$\|Flow_{t-1}\|$	$SENT_{t-1}^{US}\times$ $\|Flow_{t-1}\|$	R^2
			Panel A. Size and Risk				
ME	SMB	0.31	-0.18	0.29	0.51	**-0.42**	1.6%
		[.22]	[.33]	[.22]	[.01]	**[.01]**	
σ	High-Low	-0.25	-0.39	-0.04	0.48	**-0.44**	3.4%
		[.38]	[.04]	[.91]	[.05]	**[.02]**	
			Panel B. Growth Opportunity				
BE/ME	Low-Medium	0.11	-0.26	0.40	0.04	**-0.20**	0.8%
		[.67]	[.04]	[.06]	[.72]	**[.09]**	
GS	High-Medium	0.36	-0.20	0.25	-0.09	**-0.19**	1.1%
		[.16]	[.20]	[.26]	[.33]	**[.04]**	
			Panel C. Distress				
BE/ME	High-Medium	0.09	0.05	-0.29	0.18	**0.05**	0.9%
		[.61]	[.63]	[.13]	[.08]	**[.59]**	
GS	Low-Medium	-0.15	-0.08	0.29	-0.07	**-0.21**	0.8%
		[.22]	[.34]	[.02]	[.43]	**[.00]**	

$$R_{X_{it}=long,t} - R_{X_{it}=short,t} = a + bSENT_{t-1}^{Total} + cSENT_{t-1}^{US} + d|Flow_{t-1}| + eSENT_{t-1}^{US} \times |Flow_{t-1}| + u_t$$

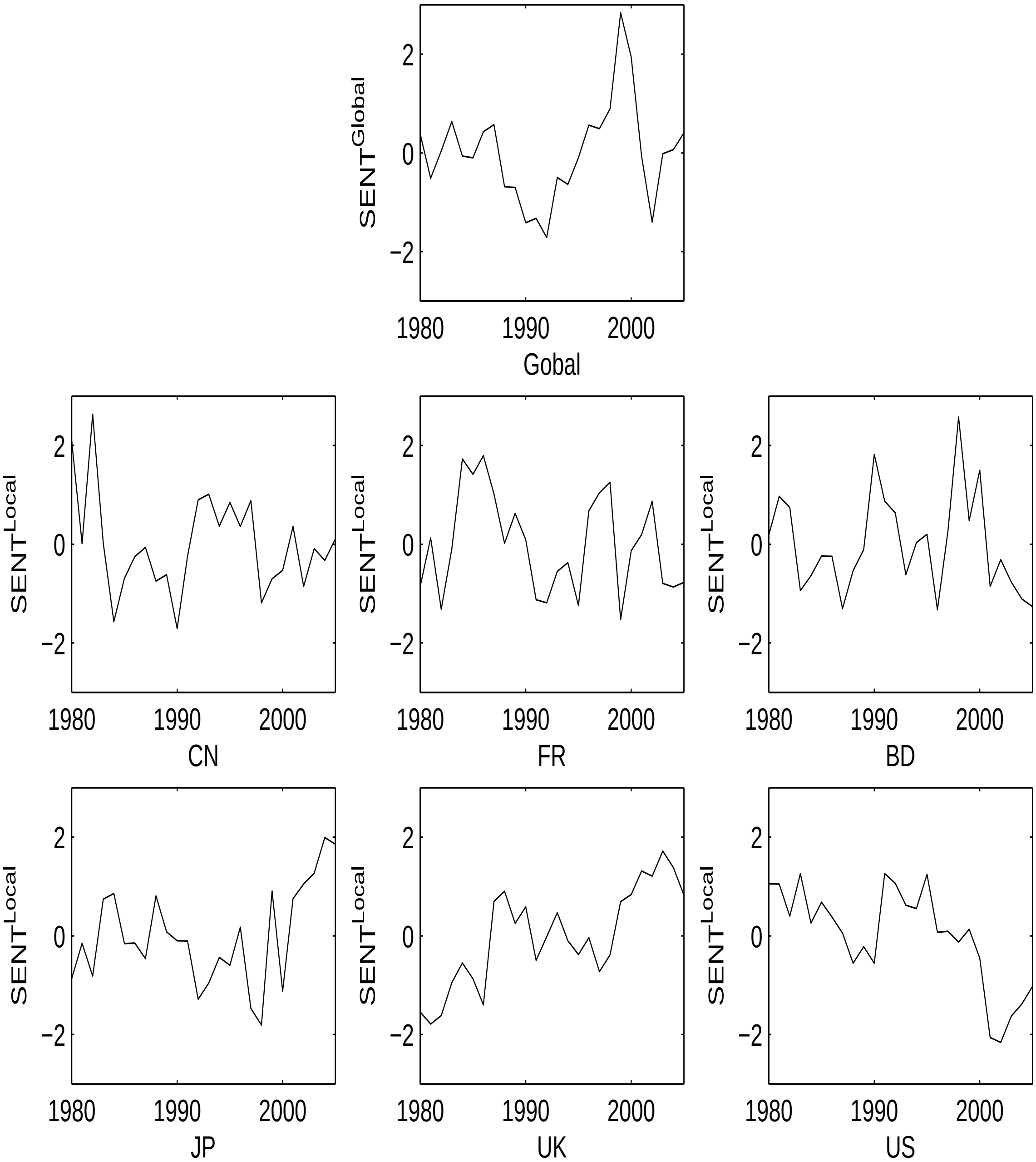
The dependent variable is the long-short equal-weighted portfolio return from the five countries: Canada, France, Germany, Japan, and UK. $|Flow_{t-1}|$ is the absolute value of the normalized capital flow between US and the other five countries. It is normalized by the market value of the foreign stock market. The long-short portfolios are formed based on firm characteristics (X): firm size (ME), total risk (σ), book-to-market ratio (BE/ME), and sale growth (GS). High includes the top two deciles; low includes the bottom two deciles; medium includes the middle two deciles. Clustered p values are in braces.

Figure 1: The Total Sentiment, 1980 to 2005



Total sentiment, $SENT^{Total}$, is the first principal component of the four measures within one country. The first measure ($PVOL$) is the year-end log ratio of the value-weighted average market-to-book ratios of high volatile stocks and low volatile stocks. The second measure ($NIPO$) is the log annual number of initial public offerings. The third measure ($RIPO$) is the average annual first-day returns of initial public offerings. The fourth measure ($TURN$) is detrended log turnover.

Figure 2: The Global and Local Sentiment, 1980 to 2005



Global sentiment ($SENT^{Global}$) is the first principal component of the six total sentiment indexes ($SENT^{Total}$) in Canada, France, Germany, Japan, UK, and US. Local sentiment ($SENT^{Local}$) is the orthogonal residual from the regression, $SENT^{Total} = b_i\ SENT^{Global} + SENT^{Local}$, within a country.