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Familiarity and Surprises in International Financial Markets: Bad News Travels like Wildfire, Good News Travels Slow

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Familiarity and Surprises in International Financial Markets: Bad news travels like wildfire, good news travels slow*

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Abstract

In this paper, we decompose attention allocation in two components – the familiar and the surprising – with opposite implications for US purchases of foreign stocks. On one hand, familiarity-induced attention leads to an increase in US holdings of foreign equities. On the other hand, surprise-induced attention is associated with net selling of foreign stocks because US investors tend to pay more attention to negative than to positive economic surprises from other countries. Our findings suggest that information asymmetries between locals and non-locals are more pronounced when it comes to good news, with information regarding bad news being relatively symmetric.

Keywords: US Purchases of Foreign Stocks, Attention Allocation, Asymmetric Information, Geography, Economic Surprises.

JEL Codes: F30, D82, G11.

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"Well bad news travels like wildfire, good news travel slow. They all call me Wildfire, 'cause everybody knows I'm bad, everywhere I go."

– Bad News, song written by John Loudermilk and performed by Johnny Cash.

1 Introduction

When we browse the headlines of our daily newspaper, which stories attract our attention? Do we focus on the familiar, for instance, business news about the industry we work in, political news about our local government, or sports news about our favorite teams? Or are we attracted to surprising events, such as natural disasters or economic crisis, even in remote places? In this paper, we decompose attention allocation into two components – the familiar and the surprising – with opposite implications for US purchases of foreign stocks. We confirm that familiarity-induced attention leads to an increase in US holdings of foreign equities. On the other hand, surprise-induced attention is associated with net selling of foreign stocks because US investors' tend to pay more attention to negative than to positive surprises from other countries. In international financial markets, bad news travels faster than good news.

Attention is a scarce resource. Rational agents, facing this information processing constraint, have to constantly reallocate shares of their attention endowment towards pieces of information they deem relevant to their current and future economic decisions.[1] Therefore, if we could observe agents' revealed attention, we should expect to be able to predict their economic behavior. Varian and Choi (2009a, 2009b) show that this is indeed the case in the goods, services, and labor markets. Using Google search volume index (henceforth, Google SVI) for certain queries as a proxy for attention, the authors can predict the current level of home and automotive sales, travel behavior, and initial claims for unemployment.[2]

In principle, we should not expect similar results to hold in asset markets. An asset itself does not (or should not) render utility to its holder. What matters is the monetary payoff associated to the asset – a combination of dividends paid and the price change while holding

[1] See Sims (2003, 2006) for a formalization of information processing constraints in economic problems.

[2] Albeit workers also look for other jobs while they are currently employed, job search effort is definitely more intensive when they are unemployed.

the asset. Since the exact monetary payoff (particularly, the price change) is only known after the asset is sold, the decision to sell should be at least just as important as the decision to buy. Notwithstanding, evidence documented in the finance literature suggests that individual investors are net buyers of attention-grabbing stocks. Barber and Odean (2008) reason that buying decisions involve a search over thousands of stocks and, hence, stocks which attract our attention – for being in the news, for experiencing abnormally high trading volumes or extreme one day returns – are more likely to be considered. The same issue would not arise during selling decisions because individual investors tend to sell only stocks they already own. Recent studies find supporting evidence of attention-induced buying in US stock markets using Google SVI data. Da et al (2011) show that an abnormal increase in queries containing a stock ticker symbol can predict a temporary increase in the price of that same stock. Mondria and Wu (2011) focus on the asymmetry in search queries for stock tickers between locals and non-locals. They find that local investors tend to search more about local stocks relative to their non-local counterparts, and that stocks experiencing abnormally asymmetric increases in search volume also earn abnormally high returns.

The international finance literature also documents evidence on the importance of attention in portfolio allocation decisions, but with more emphasis on the role of geography. Geography was first used to explain international trade in assets by Portes and Rey (2005), who found that a gravity model would account for a significant share of variation in cross-border equity flows. According to the authors, geographical distance is a barrier to cultural exchange and thus a good proxy for familiarity or information costs. Theoretical work from Van Nieuwerburgh and Veldkamp (2009) and Mondria and Wu (2010) reveal that when investors face information processing constraints, interaction between portfolio and attention allocation choices can amplify small exogenous informational asymmetries into large levels of home bias.[3] Mondria et al (2010) and Mondria and Wu (2012) find empirical support to such predictions. Specifically, they construct proxies for attention using Internet search query data (from AOL in the former, and from Google in the latter) and present empirical evidence that

[3]The home equity bias puzzle was first documented by French and Poterba (1991) and Tesar and Werner (1995). In the domestic market, investors' preference for local stocks has also been documented by Coval and Moskowitz (1999).

small increases in familiarity or financial integration lead to an increase in attention allocation and, consequently, to a reduction in home equity bias.

While both literatures are documenting similar phenomena, different dimensions of attention are driving each result. In international finance, emphasis on geography suggests that familiarity-induced attention is the main channel being explored. In finance, however, results appear to be capturing a mixture of both: stocks which are constantly in the news are definitely more familiar to individual investors, but abnormal trading volume and extreme returns are, by definition, unusual events. In this paper, we bridge both literatures together by presenting a methodology which formally disentangles the influence of familiarity and surprises on attention and the implications of each component for asset allocation choices. First, we follow Mondria and Wu (2011b) and construct a measure of Americans' revealed attention towards domestic and foreign stocks based on Google SVI for queries which lead users to real-time financial information from those markets. Using a panel of monthly data from January 2006 to December 2010, we find that, contrary to what has been suggested by previous studies, an increase in the attention Americans allocate towards foreign stock markets is associated to US net sales of foreign stocks.

In order to understand and isolate the importance of geography, we estimate a gravity model for our attention allocation variable and calculate two new series: the fitted-values (or the part of attention which is predicted by geography) and the residuals (the unpredicted part). Then, we reassess the effects of attention on US purchases of foreign stocks by including both components (predicted and unpredicted attention) as separate regressors. We find that the effect of predicted attention is positive, while the effect of unpredicted attention is negative. Given intuition provided by Portes and Rey (2005) – that gravity variables capture cultural proximity and information costs – we interpret the predicted part of attention as its familiarity-induced component. Then, the remaining question is: what drives the unpredicted part of attention, and why does it have a negative effect on US purchases of foreign equities? We show that economic surprise indices (i.e., an aggregate of standardized differences between macroeconomic announcements and their expected values) help explain the variation in at-

tention which is not related to geography. Moreover, we find that an increase in the attention Americans allocate to different equity markets reflects different compositions between good and bad news, depending on their familiarity level with those markets. In its own local market, Americans tend to process more information about good news rather than bad news.[4] In Canada, a foreign market which is nonetheless culturally similar to the US, Americans tend to process information about good and bad news equally. Finally, in other non-local markets located in Europe and Asia, Americans tend to process more information about bad news rather than good news. In sum, these results suggest that the part of attention which is not predicted by gravity is capturing surprise-induced attention and that its negative effect on US purchases of foreign stocks is mainly due to US investors' propensity to process more information regarding bad news rather than good news from other countries.

Our evidence that investors' responsiveness to good relative to bad news depends on how they relate to the location from which the news originate (i.e., their own country, neighboring countries, or distant foreign countries) is compatible with studies of information processing at the individual level. Different papers have shown that individuals react to positive and negative information about personal qualities differently depending on whether the feedback is about themselves or about other people. The psychology literature on impression formation (e.g., Ronis and Lipinski, 1985; Singh and Teoh, 2000; Van der Pligt and Eiser, 1980; Vonk, 1993, 1996) finds that unfavorable information has greater impact on our impression about others than favorable information. In contrast, an experiment conducted by Eil and Rao (2011) reveals that when the information is about a quality of the agent herself, positive feedback is rationally processed (i.e., according to a Bayes' rule) while negative feedback tend to be ignored or disregarded.

Many papers have studied the portfolio holdings implications of asymmetric information sets. Locals' informational advantage is used to explain home bias, or underdiversification, in Ahearne et al (2004), Bekaert (1995), Chan et al (2005), Dahlquist et al (2003), and Kraay et al (2005); and local's abnormal return from local investments in Coval and Moskowitz

[4] Which is compatible with the results of Barber and Odean (2008), Da et al (2011), and Mondria and Wu (2011).

(2001) and Malloy (2005). However, to our knowledge, our paper is the first to suggest that asymmetries between locals and non-locals are more pronounced when it comes to good news, with information regarding bad news being relatively symmetric. Finally, our evidence that both locals and non-locals react to negative surprises while only locals tend to react to positive surprises could help explain the asymmetric effects of good versus bad news on conditional returns and volatilities reported by Conrad et al (2002) for stocks; Hautsch and Hess (2002) for bonds; and Andersen et al (2003) for exchange rates.

The remainder of the paper is organized as follows. Section 2 describes the data set. Section 3 explains the methodology. Section 4 explores the relationship between US net purchases of foreign stocks and attention allocation. Section 5 analyses how attention responds to economic news. Finally, section 6 concludes.

2 Data

This section describes our panel data set, which includes observations from 2006 to 2010 for the following 10 major equity markets: Australia, Canada, China, Japan, New Zealand, Norway, Sweden, Switzerland, United Kingdom, and United States.[5,6]

2.1 Attention Allocation

Da et al (2011) propose a direct measure of the attention investors pay to particular stocks using Google SVI for search queries containing the stock ticker symbol.[7] For instance, if you type the stock ticker symbol for Microsoft Corporation, "MSFT", inside the Google search box, the first link in the results page will most likely lead you to either Yahoo! Finance or Google Finance. Needless to say, in both websites you will find real-time stock quotes, historical

[5] Our sample period starts in 2006 since Google SVI for some countries contains a large number of "zeroes" in 2004 and 2005 (specially at the weekly frequency).

[6] These are the 10 countries for which Citigroup compiles individual economic surprise indices. Economic surprise indices are not available for the Euro area's individual members, but only as a regional aggregate. Unfortunately, the Euro area is not in our sample since we could not obtain a clean measure of attention allocation towards an entire region comprising of 17 different economies, each with its own stock exchange.

[7] Google SVI for a particular search query represents the search traffic for the query relative to the total number of searches on Google at a given location and time period. An increase in Google SVI allows us to conclude that the search query is becoming more popular, but not that the absolute number of searches for the query is increasing.

charts, and financial news related to Microsoft Corporation. This will also be true for most, although not all, stocks traded in the US market.

Since in this paper we are interested in the attention Americans allocate to foreign stocks, a natural extension of their methodology is to download Google SVI for search queries containing ticker symbols associated to each foreign market's main equity index, such as "AORD" for the Australian All Ordinaries or "N225" for the Japanese Nikkei 225.[8] On one hand, these search queries will definitely find us real-time financial information about both equity indices. On the other hand, this procedure implicitly assumes that all US investors who trade foreign stocks are necessarily buying or selling stock market indices, which is certainly not true. Many US investors might be just as interested in buying or selling individual Canadian or Japanese stocks included in the All Ordinaries or in the Nikkei 225.

The natural place to find real-time financial information not only about a foreign country composite equity index, but also about individual stocks included in the composite index is in the country's stock exchange website. Therefore, we measure the attention investors allocate to foreign stocks using Google SVI for search queries containing a combination of country name, country demonym, and city in which the stock exchange is located, all followed by the word "stock." Google searches for any term in "Australia stock + Australian stock + Sydney stock" will lead you to the Australian Securities Exchange website (http://www.asx.com.au/). Similarly, Google searches for any terms in "Japan stock + Japanese stock + Tokyo stock" will lead you to the Tokyo Stock Exchange website (http://www.tse.or.jp/english/).

[Insert Table 1 about here]

We download the data from Google Insights for Search, which allows us to filter the results in such a way that only searches originating from the US are included.[9] One restriction imposed by Google Insights for Search is that each consultation is limited to five terms at a time. Furthermore, results are normalized so that the highest search traffic recorded in the downloaded sample is assigned a value of 100. Therefore, when downloading our data we

[8] These ticker symbols are used by Reuters, and are not necessarily the same used by Bloomberg.
[9] Google Insights for Search uses IP address information to identify the location of its users.

repeat one country in all consultations so that we are able to renormalize the results in a way that the final data reflects the relative popularity between all countries in our sample.[10] Table 1 reveals that Americans naturally allocate more attention towards their own local market, with a Google SVI sample average of 87.01. China is a distant second, followed closely by Canada and United Kingdom, with Google SVI sample averages of 17.93, 17.50, and 15.51, respectively. Then, in fifth place, we see Japan, with a Google SVI sample average of 10.69.

2.2 Economic Surprise Indices

Citigroup calculates economic surprise indices for some countries and regions based on the aggregation of the unanticipated component of different macroeconomic announcements. Different macroeconomic indicators are officially announced in different measurement units (nonfarm payrolls in number of workers, CPI in percentage points, and trade balance in US$). Hence, the aggregation methodology involves, first, the normalization of the unexpected component into standardized news surprises. Let $A_{q,i,t}$ denote the value of a given macroeconomic fundamental q from country i announced at date t. Let $E_{q,i,t}$ refer to the median value of the preceding market expectations collected by the Bloomberg survey for the corresponding announcement, and let $\widehat{\sigma}_{q,i}$ denote the sample standard deviation of all the surprise components associated with fundamental q from country i. The standardized surprise of macroeconomic fundamental q from country i announced at date t is then defined as $S_{q,i,t} = \frac{A_{q,i,t} - E_{q,i,t}}{\widehat{\sigma}_{q,i}}$.

Once all fundamentals q from country i are standardized, the question is how to aggregate them into a single country i index. For instance, should standardized news surprises in unemployment have the same sign as standardized news surprises in nonfarm payrolls, even though positive readings for the former suggest weaker than expected labor markets while positive readings for the latter suggest the exact opposite? Additionally, should we weigh a one unit standardized news surprise in CPI the same way as an equivalent standardized news surprise in industrial production, or are some announcements more relevant than others?

Citigroup's methodology attributes different weights $\theta_{q,i}$ to different fundamentals q based on high-frequency regressions of spot exchange rates on standardized news surprises. Funda-

[10] With a simple application of the "rule of three."

mentals q which have stronger impact on exchange rate dynamics are deemed more relevant by market participants and hence receive larger weights. This also implies that positive readings of the economic surprise index indicate stronger than expected economic activity.[11] Finally, the indices are calculated daily in a rolling three-month window. Another set of weights ρ_τ discounts past observations employing a time decay function, which replicates the limited memory of markets:

$$surprise_{i,t} = \sum_{\tau=0}^{T} \sum_{q=1}^{Q_i} \rho_\tau \theta_{q,i} S_{q,i,t-\tau} \tag{1}$$

It is important to emphasize that economic surprise indices are measures of unexpected economic performance, and not of economic performance *per se*. Figure 1 describes the daily evolution of the economic surprise index for the US. Although US economic growth has been unimpressive since the Global Financial Crisis of 2008, the economic surprise index has not remained negative since then. The economic surprise index indeed suffers a sharp drop which starts 10 days before the bankruptcy of Lehman Brothers and lasts for roughly a quarter. But as agents start to update their expectations regarding the weaker prospects for US growth, the economic surprise index converges back to zero.

[Insert Figure 1 about here]

2.3 US Net Purchases of Foreign Stocks

The US Department of the Treasury publishes monthly data on US investors' purchases and sales of foreign stocks in individual countries and regions in its Treasury International Capital (TIC) System (in US$ billion). Note that our interest lies in the behavior of US net purchases of foreign stocks and not in US bilateral equity flows, which also take into account foreigners' net sales of US stocks.

[11] Using 5-minute spot exchange rates, Andersen et al (2003) find that "favorable U.S. 'growth news' tends to produce dollar appreciation" against the German Mark, British Pound, Japanese Yen, Swiss Franc, and the Euro.

2.4 Additional Controls

We collect from Bloomberg daily data for the major stock market index of each country in our sample to construct two measures of stock market perfomance: the cummulative monthly return and the monthly standard deviation of daily returns.[12] We also collect four series from the World Bank's *World Development Indicators*: GDP (in constant 2000 US$) and market capitalization of listed companies (as share of GDP) as measures of economic size; and total land area (in square kilometers) and total population as proxies for physical mass. Using CIA's *The World Factbook* we construct two dummy variables: language, to identify English speaking countries, and common law, to denote countries which share the same legal system as that of the US. Finally, we complete our data set with a measure of geographical distance (in miles) between each country's national capital and Washington DC, the national capital of the US.

3 Methodology

Our methodology consists of two parts. In the first part, we only consider the attention Americans allocate towards the foreign countries in our sample: Australia, Canada, China, Japan, New Zealand, Norway, Sweden, Switzerland, and United Kingdom. Our objective in this first part is two-fold: to check whether an increase in attention leads to US purchases of foreign stocks and also to highlight the role played by geography in this channel.

Equation (2) models the following period's net purchases of foreign stocks by US investors using as explanatory variables the attention Americans allocate towards the destination country's equity market and a set of controls which includes gravity variables and measures of stock market performance.[13] Given empirical evidence documented in both finance and inter-

[12] The stock market indices are: the All Ordinaries in Australia; the S&P TSX Composite in Canada; the Shanghai Composite in China; the Nikkei 225 in Japan; the NZSE 50 in New Zealand; the OSE All Share in Norway; the Stockholm General in Sweden; the Swiss Market in Switzerland; the FTSE 100 in United Kingdom; and the S&P 500 in United States.

[13] We use explanatory variables in t to explain our dependent variable in $t+1$ to reduce concerns related to potential time-series endogeneity issues. For instance, shocks which generate unusually high volumes of US purchases of foreign stocks could both attract attention and affect stock market performance. With respect to gravity variables, most of them have no time-series variation (distance, language, common law, and land area) while some have variation only at the annual frequency (market capitalization, GDP, and population).

national finance, our prior expectation is to estimate a positive and statistically significant coefficient associated to attention allocation in equation (2):[14]

$$net\ purchases_{i,t+1} = \alpha_0 + \alpha_1 attention_{i,t} + \overrightarrow{\alpha}_2 additional\ controls_{i,t} + u_{i,t+1} \tag{2}$$

The set of additional controls included in equation (2) follows Portes and Rey (2005), who show that gravity is an important determinant of cross-border equity flows. We include three proxies for cultural proximity: geographical distance, language, and common law; and we expect information costs to decrease with greater familiarity, therefore leading to more positive equity flows. We also expect larger economies, either in terms of economic activity (market capitalization and GDP) or physical size (population and land area), to attract larger equity flows from US investors. Furthermore, we also include two measures of stock market performance in the destination country. We include monthly stock market returns to allow for "return chasing" behavior, in which case we should expect a positive coefficient, and also the monthly standard deviation of daily returns as a proxy for market volatility, for which we expect a negative coefficient. Since we are only focusing on net purchases of foreign stocks made by US investors, the inclusion of time dummies fully control for omitted factors such as changes in US investors' risk appetite or US markets' liquidity conditions, which may affect their behavior through time but uniformly across destination countries.

In order to understand and isolate the importance of geography, first we estimate a gravity model for our attention allocation variable. We anticipate attention allocation to increase the greater the cultural proximity, proxied by distance, language, and common law; the larger the economic size, captured by market capitalization and GDP; and also the larger the physical mass, measured by land area and total population:

$$attention_{i,t} = \delta_0 + \overrightarrow{\delta}_1 gravity\ variables_{i,t} + \eta_{i,t} \tag{3}$$

We use estimation output from equation (3) to decompose attention allocation into two series:

[14] Reviewed in the Introduction.

the part which is predicted by geography, given by the fitted-values, and the unpredicted part, given by the residuals. Then, we reassess the effects of attention on US purchases of foreign stocks by including both components (predicted and unpredicted attention) as separate regressors:

$$net\ purchases_{i,t+1} = \alpha_0 + \alpha_1 attention_{i,t}^{pred} + \alpha_2 attention_{i,t}^{unpred} + \overrightarrow{\alpha}_3 additional\ controls_{i,t} + u_{i,t+1} \tag{4}$$

In the second part, our objective is to test whether (and how) economic surprises relate to unpredicted attention. In this part we also include the attention Americans allocate towards their own country, the US, in the sample so we can explore potential asymmetries in the reactions to local versus non-local news. Our baseline model in this second part is given by equation (5):

$$attention_{i,t} = \beta_0 + \beta_1 \left(surprise_{i,t}\right)^2 + \overrightarrow{\beta}_2 gravity\ variables_{i,t} + \varepsilon_{i,t} \tag{5}$$

Note that the coefficient β_1 captures the effect of economic surprises on the component of attention allocation which is not explained by gravity.[15,16] Our initial prior is that both good and bad news from different countries attract attention from Americans in a similar manner. Hence, we include in equation (5) the squared value of the economic surprise index as a regressor, expecting to estimate a positive and statistically significant coefficient.[17] With respect to the set of gravity variables, our priors are the same as described in (3): attention should increase with cultural proximity and economic and physical mass.

After estimating our empirical model exactly as described by equation (5), we propose three additional extensions. In equation (6), we allow the semi-elasticity of attention with respect to squared surprises to vary with distance. Although we expect distance, as an inverse measure of cultural proximity, to have a negative effect on the level of attention allocation,

[15] Equivalently, if we obtain $attention_{i,t}^{unpred}$ as the residuals of equation (3), then β_1 in (5) equals γ_1 in: $attention_{i,t}^{unpred} = \gamma_0 + \gamma_1 \left(surprise_{i,t}\right)^2 + \overrightarrow{\gamma}_2 gravity\ variables_{i,t} + \xi_{i,t}$.

[16] Economic surprises represent arrival of new information which has not yet been incorporated by financial markets participants. Hence, reverse causality is not a concern.

[17] Results are very similar if absolute value of economic surprise index is used instead (available upon request).

we have no priors on how it should affect the derivative of attention allocation with respect to economic surprise:

$$\beta_1 = \widetilde{\beta}_1 + \widetilde{\beta}_2 distance_i \tag{6}$$

In equation (7), we estimate separate semi-elasticities of attention with respect to squared positive and negative economic surprises. Intuitively, we are allowing Americans to allocate their attention asymmetrically between good and bad news:

$$\beta_1 = \begin{cases} \widetilde{\beta}_1, \text{ if } surprise_{i,t} \geq 0; \\ \widetilde{\beta}_2, \text{ if } surprise_{i,t} < 0. \end{cases} \tag{7}$$

Finally, in equation (8), we consider a double interaction between squared positive and negative surprises with distance:

$$\beta_1 = \begin{cases} \widetilde{\beta}_1 + \widetilde{\beta}_2 distance_i, \text{ if } surprise_{i,t} \geq 0; \\ \widetilde{\beta}_3 + \widetilde{\beta}_4 distance_i, \text{ if } surprise_{i,t} < 0. \end{cases} \tag{8}$$

4 Attention Allocation and US Net Purchases of Foreign Stocks

In this section, we test whether shocks to the attention Americans allocate towards foreign markets lead to an increase in US investors' net purchases of those foreign, with a special focus on the importance of geography as a proxy for familiarity.

4.1 Effects of Attention Allocation

Equation (2) models the following period's net purchases of foreign stocks by US investors using as explanatory variables the attention Americans allocate towards each destination country's equity market, measures of stock market performance, and gravity variables. Column (2.1) in Table 2 presents the estimation output using our full sample: monthly data from January 2006 to December 2010.[18] Contrary to our prior expectations, attention allocation yields a negative and statistically significant coefficient: a 10% increase in the attention Americans

[18] Monthly data is used in this section since this is the highest frequency at which US purchases of foreign stocks series is available.

allocate to a foreign equity market is associated to a decrease in US net purchases of that market's stocks of US$ 70.5 million.

[Insert Table 2 about here]

Estimated coefficients associated to both measures of stock market performance in the destination economy suggest that second moments are more relevant than first moments. Specifically, we do not find evidence that contemporary monthly returns are related to US net purchases of foreign stocks.[19] Realized stock market volatility, in turn, has a negative and statistically significant coefficient: a 100 basis-point (or one percentage-point) increase in the monthly standard deviation of daily returns in the stock market of the destination country reduces US net purchases of that country's stocks by US$ 73.9 million.[20] With regards to gravity variables, all three measures of cultural proximity are statistically significant: a 100% increase in geographical distance between a country's national capital and Washington DC reduces US purchases of that country's stocks by US$ 408 million; and countries which share the same language (English) and same legal system (common law) as that of the US tend to receive on average an additional US$ 1,139 million and US$ 1,355 million, respectively, in equity flows from US investors. Moreover, larger economies are more likely to attract larger equity flows from US investors: a 10% increase in a country's market capitalization or GDP increases US net purchases of that country's stocks by US$ 53.6 million and US$ 37.4 million, respectively. Finally, physical size has ambiguous effects on the amount of foreign stocks US investors purchase: while a 10% increase in total population increases it by US$ 58.2 million, a 10% increase in land area reduces it by US$ 35.8 million.

One potential explanation for the negative and significant coefficient of attention allocation in the net purchase of stocks equation is the choice of sample period. Our sample period includes the global financial crisis of 2008, an event which attracted a lot of attention in the American society and simultaneously forced US investors to sell foreign stocks across the globe

[19] This coefficient remains statistically insignificant if we use lagged monthly returns instead.

[20] As we have mentioned in our methodological description, our panel data only has variation in country of destination, but not with respect to country of origin, since we are only focusing on net purchases made by US investors. Therefore, stock market performance in the country of origin is fully controlled by the inclusion of time effects.

due to liquidity constraints. Consequently, a regression between both variables would capture this negative co-movement in spite of the absence of any direct economic linkage between them. In order to check this alternative story, we re-estimate equation (2) excluding 2008 from the sample. However, estimation output reported by Column (2.2) in Table 2 shows that the effect of attention on US net purchases of foreign stocks becomes not only more significant, but also larger in magnitude once the financial crisis is ommitted.

4.2 Predicted versus Unpredicted Attention

Contrary to empirical evidence document in finance and international finance, our initial regressions suggest that attention allocation has a negative and significant effect on US purchases of foreign stocks. Our first step to better understand such surprising results is to isolate the familiarity channel. Portes and Rey (2005), Mondria and Wu (2010), and Mondria and Wu (2011b) show that familiarity – proxied by geography – induces attention which, in turn, is positive for holdings of foreign equities.

Column (3.1) in Table 3 reports estimation output of the gravity model for attention allocation. It is interesting to note that the estimated coefficients reinforce previous results documenting the geography of endogenous information sets. Our three proxies for cultural proximity are statistically significant: a 100% increase in geographical distance leads to a reduction in attention of 31.5%; English speaking countries tend to attract 80% more attention than non-English speaking countries; and Americans allocate on average 18.1% more attention to countries whose legal system is also based on common law. Both measures of economic mass are also statistically significant: a 10% increase in market capitalization or GDP increases attention by 2.6% or 3.5%, respectively. Regarding physical size, only population renders a significant coefficient: a 10% increase in population leads to an increase in attention of 3.2%.

[Insert Table 3 about here]

Once we verify that familiarity breeds attention, we move on to test whether familiarity-induced attention leads to US purchases of foreign equities. First, we use the fitted-values of regression (3.1) as proxy for the variation in attention which is predicted by geography and the

residuals as proxy for the unpredicted part. Then, we estimate equation (4) in which both components of attention (predicted and unpredicted) are included as independent determinants of US net purchases of foreign stocks. Column (3.2) in Table 3 confirms that familiarity-induced attention does have a positive effect on holdings of foreign equity: a 10% increase in predicted attention increases US purchases of foreign stocks by US$ 72.0 million. The results also suggest that geography – and specially distance – mainly affects equity flows through attention, and not directly.[21] Then, the remaining question is: what determines the unpredicted part of attention, and why does it have a negative effect on US purchases of foreign equities?

5 Attention Allocation and Economic Surprises

Our evidence that unpredicted attention leads to selling pressures in international stock markets seems to disagree with the findings of Barber and Odean (2008), Da et al (2011), and Mondria and Wu (2011a) in which surprising events (for instance, extreme returns or abnormal trading volume) induce buying pressures in US stocks. One possible explanation for this apparent contradiction is that the bits of information economic agents process from local and non-local markets are qualitatively different. In this section, we test this hypothesis by studying the determinants of US attention allocation, with a special focus on potential distinctions in the reaction to good and bad economic news depending on whether they arise from local or non-local markets.

5.1 Asymmetric Responses to Economic Surprises

Equation (5) describes the attention allocated by Americans towards the US and nine other foreign stock markets as a function of economic surprises and a set of gravity variables capturing cultural proximity, economic size, and physical size. Column (4.1) in Table 4 presents the estimation output using weekly data, from the first week of 2006 to the last week of 2010.[22] Once again, estimated coefficients associated to the gravity variables underline the influence

[21] Note that one gravity variable (language) was dropped to prevent perfect multicolinearity with predicted attention.

[22] Note that in this section we are able to estimate our model using a higher frequency (weekly rather than monthly) since we are not including US purchases of foreign stocks in the regressions.

of geography in endogenous information sets. All three proxies for cultural proximity are statistically significant at the 1% level and their signs confirm that familiarity breeds attention: a 100% increase in the distance between a country's national capital and Washington DC leads to a 5% decrease in attention; and countries which share the same language (English) or legal system (common law) as that of the US receive 69% or 35% more attention from Americans, respectively. Additionally, all measures of economic and physical mass are statistically significant at the 1% level as well: a 10% increase in a country's market capitalization or GDP increases the attention allocated by US investors towards that country's equity market by 3.6% or 4.0%, respectively; and a 10% increase land area or population size increases attention by 2.9% or 0.3% respectively.

[Insert Table 4 about here]

Secondly, column (4.1) reveals that country specific economic surprises also affect the attention Americans allocate towards that country's stocks. Particularly, the estimated coefficient associated with squared surprises is positive and statistically significant at the 1% level. The estimated semi-elasticity suggests that a one standard deviation increase in squared surprises increases attention allocation by 3.9%, which is roughly the same effect of an 80% reduction in distance between national capitals, or a 11% increase in market capitalization or a 10% increase in GDP.[23]

Column (4.2) in Table 4 re-estimates equation (5) but allows the semi-elasticity of attention with respect to squared economic surprises to vary with distance, as in equation (6). The interaction term between squared surprises and distance is indeed statistically significant and suggests that for each 100% increase in distance, there is a loss of about 8.9% in the magnitude of the semi-elasticity. For instance, a one standard deviation squared surprise in US economic data would increase the attention Americans allocate to US stocks by 13.8%, while the exact same size shock in Australian economic data would only increase the attention Americans allocate to Australian stocks by 2.5%. In other words, Americans not only pay more attention (in levels) to more familiar economies, but they also seem to be more responsive (in semi-

[23] The standard deviation of squared surprises in our sample is 5,983.41.

elasticities) to economic news from more familiar economies, when using distance as a measure of cultural proximity. It is also worth mentioning that although our empirical model includes three different proxies for cultural proximity, interaction terms between squared surprises with language or common law do not render statistically significant coefficients – only distance seems to affect the intensity of the response of attention to surprises.

[Insert Table 5 about here]

Table 5 presents estimation outputs of equation (5) but takes into account potential asymmetries in the responses to positive versus negative surprises. Column (5.1) estimates separate semi-elasticities of attention with respect to squared positive and negative surprises, as described by equation (7), and finds that only squared negative surprise renders a statistically significant coefficient. This result suggests that Americans solely pay attention to bad news, while tending to ignore good news. A more detailed picture is painted by column (5.2), which not only separates the responses to squared positive and negative surprises, but also allows distance to affect the magnitude of each individual semi-elasticity, as formalized in (8). First, ignoring the interaction terms, we find that, the semi-elasticity of squared positive surprises is larger than that of squared negative surprises. Second, the coefficient associated with the interaction between squared negative surprises and distance is not statistically significant, which implies that the attention Americans allocate to different stock markets responds uniformly to bad news, regardless of the country from which the economic news originate. Third, contrary to what is observed for bad news, an increase in distance, or equivalently a reduction in cultural proximity, does dampen the reaction to good news.

[Insert Figure 2 about here]

To help visualize the practical lessons that such results entail, Figure 2 presents the individual semi-elasticities of the attention Americans allocate to country i with respect to both positive and negative surprises originating from country i, which is calculated based on the estimation output of column (5.2). Blue columns refer to reactions to positive surprises and red columns, to negative surprises. Transparent (non-solid) colors denote that the individual

semi-elasticity is not statistically significantly different from zero at the 5% significance level. Moreover, the symbol "*" by the country name denotes that the semi-elasticity to squared positive surprises is statistically different from the semi-elasticity to squared negative surprises at the 5% significance level. It is clear from Figure 2 that an increase in the attention Americans allocate to different equity markets reflects different compositions between good and bad news. In its own local market, Americans tend to process more information about good news rather than bad news. In Canada, a non-local market which is nonetheless culturally similar to the US, Americans tend to process information about good and bad news equally. Finally, in other non-local markets located in Europe and Asia, Americans tend to process more information about bad news rather than good news.

5.2 Robustness Checks

One concern we have with the empirical evidence obtained in the previous section is that the distinction between US and non-US markets might be driving all results. In other words, the only relevant information is whether a market is domestic or foreign. Conditional on a market being foreign, different degrees of cultural proximity do not matter: distance is simply highlighting the contrast between the zero distance US domestic market and the positive distance foreign non-local markets. The most straightforward way to formally test this alternative hypothesis is by re-estimating all equations with a subsample which excludes the US. In other words, we only analyze the attention Americans allocate to foreign equity markets and how it responds to surprises arising from those economies.

[Insert Tables 6 and 7 about here]

However, estimation output presented in Tables 6 and 7 reject this alternative hypothesis. When we re-estimate our empirical model excluding the US from the sample, our main conclusions remain. Column (6.1) reinforces that squared economic surprises do affect attention allocation and that increases in cultural proximity, economic mass, and physical size also increase attention. The only relevant qualitative difference is regarding land area, which ceases to render a statistically significant coefficient. Column (6.2) confirms that distance dampens

the effect of squared surprises on attention by a similar factor: for each 100% increase in distance, there is a loss of 11.1% in the magnitude of the semi-elasticity. Column (7.1) shows once again that, on average, negative surprises are more important than positive surprises.

[Insert Figure 3 about here]

Finally, Figure 3 presents the individual semi-elasticities of Americans' attention towards each country's stock market with respect to economic news originating in those countries, based on estimation output reported in Column (7.2). When we exclude the US from the sample, the interaction term between squared negative surprises and distance becomes statistically significant. As a consequence, the response of attention to negative Australian news is no longer significant. However, our main results still hold: Americans tend to process information about good and bad news equally in Canada, but in all other non-local markets located in Europe and Asia (including Australia), bad news attracts more attention from Americans than good news.

[Insert Figure 4 about here]

We entertain one last possible explanation for the statistically significant dampening effect of distance on the semi-elasticity of attention with respect to economic surprises. If a country's geographical location relative to the US somehow relates to the size of its stock market, then it could be the case that it is not cultural proximity that matters, but how influent a stock market is to the world economy. Figure 4 presents the scatter plot of distance between each foreign county's national capital and Washington DC (on the horizontal axis) against market capitalization in 2010 (on the vertical axis). Canada, the closest economy, has about an average size stock market. In Europe, we find large markets such as the United Kingdom but also small ones such as Norway and Sweden. A similar pattern is found in Asia, which includes large markets such as China and Japan but also small ones such as Australia and New Zealand. In fact, the correlation coefficient between distance and market capitalization is merely 3.87%, implying that geographical distance is not a proxy for market influence.[24]

[24] Futhermore, interactions between squared positive and negative surprises with market capitalization do not result in statistically significant coefficients (regressions are available upon demand).

6 Conclusion

In this paper, we construct a measure of Americans' revealed attention towards domestic and foreign stocks based on Google SVI for queries which lead users to real-time financial information from those markets. Contrary to what has been documented by the finance and international finance literature, our initial regressions suggest that an increase in the attention Americans allocate to foreign equity markets is associate to an increase in US sales of foreign stocks.

In order to understand our puzzling results, we estimate a gravity model for our attention allocation variable and calculate two new series: the fitted-values (or the part of attention which is predicted by geography) and the residuals (the unpredicted part). Since gravity variables proxy for cultural proximity and information costs, we conclude that the predicted part of attention is its familiarity-induced component. Moreover, we show that economic surprise indices help explain the variation of unpredicted attention, allowing us to interpret it as the surprise-induced component of attention. Then, we reassess the influence of attention on US purchases of foreign stocks by including both components as separate regressors and find that familiarity-induced attention has a positive effect, while surprise-induced attention has a negative effect.

Finally, we report evidence that an increase in the attention Americans allocate to different equity markets reflects different compositions between good and bad news, depending on their familiarity level with those markets. In its own local market, Americans tend to process more information about good news rather than bad news. In Canada, a foreign market which is nonetheless culturally similar to the US, Americans tend to process information about good and bad news equally. In the other non-local markets located in Europe and Asia, Americans tend to process more information about bad news rather than good news.

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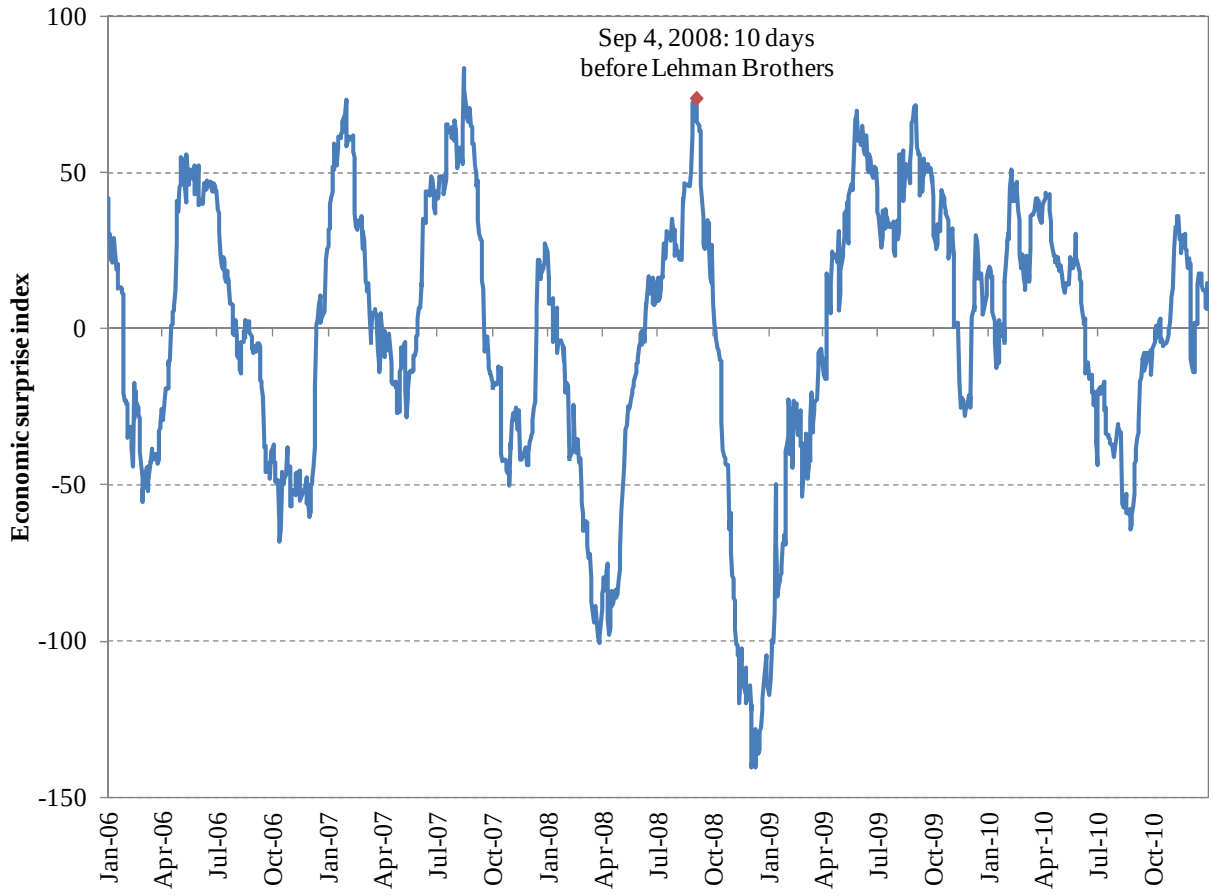
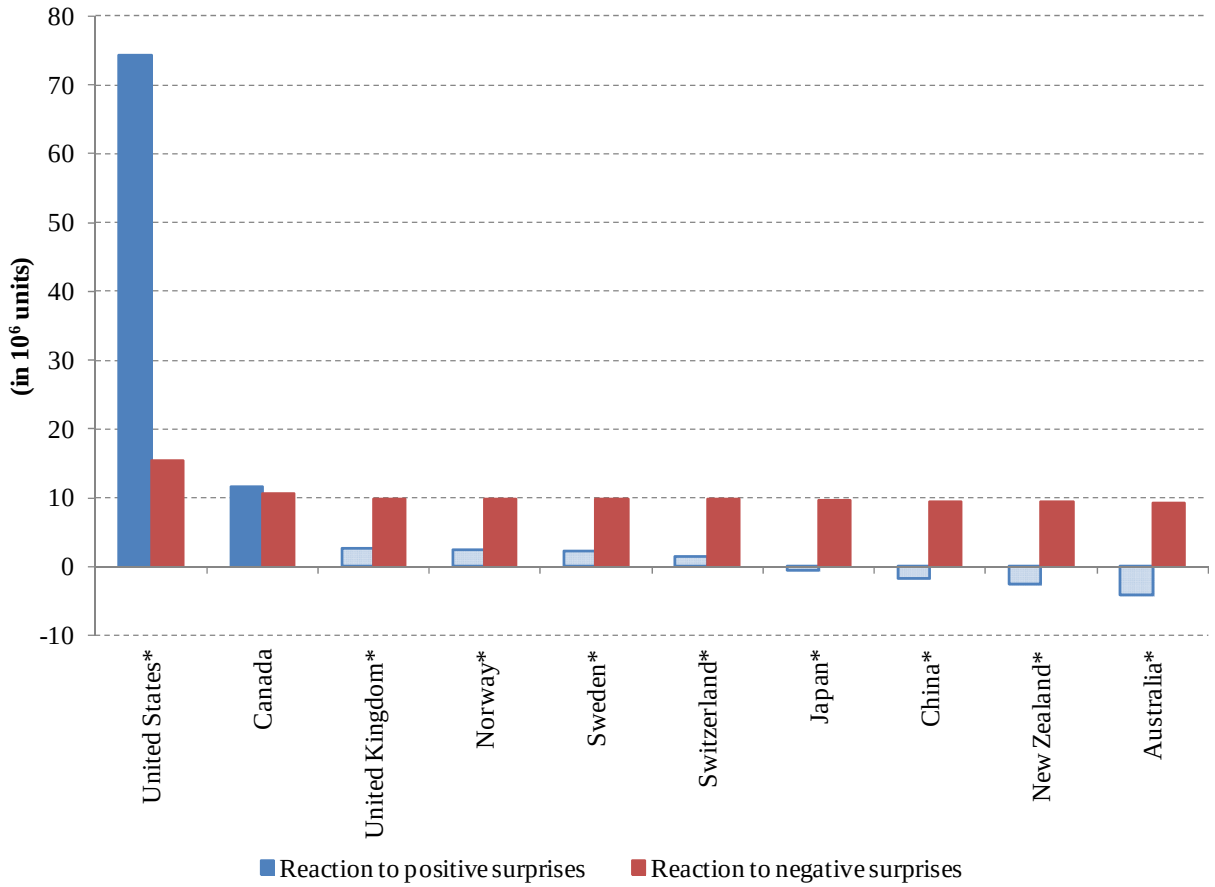
Figure 1: Evolution of Economic Surprise Index for United States



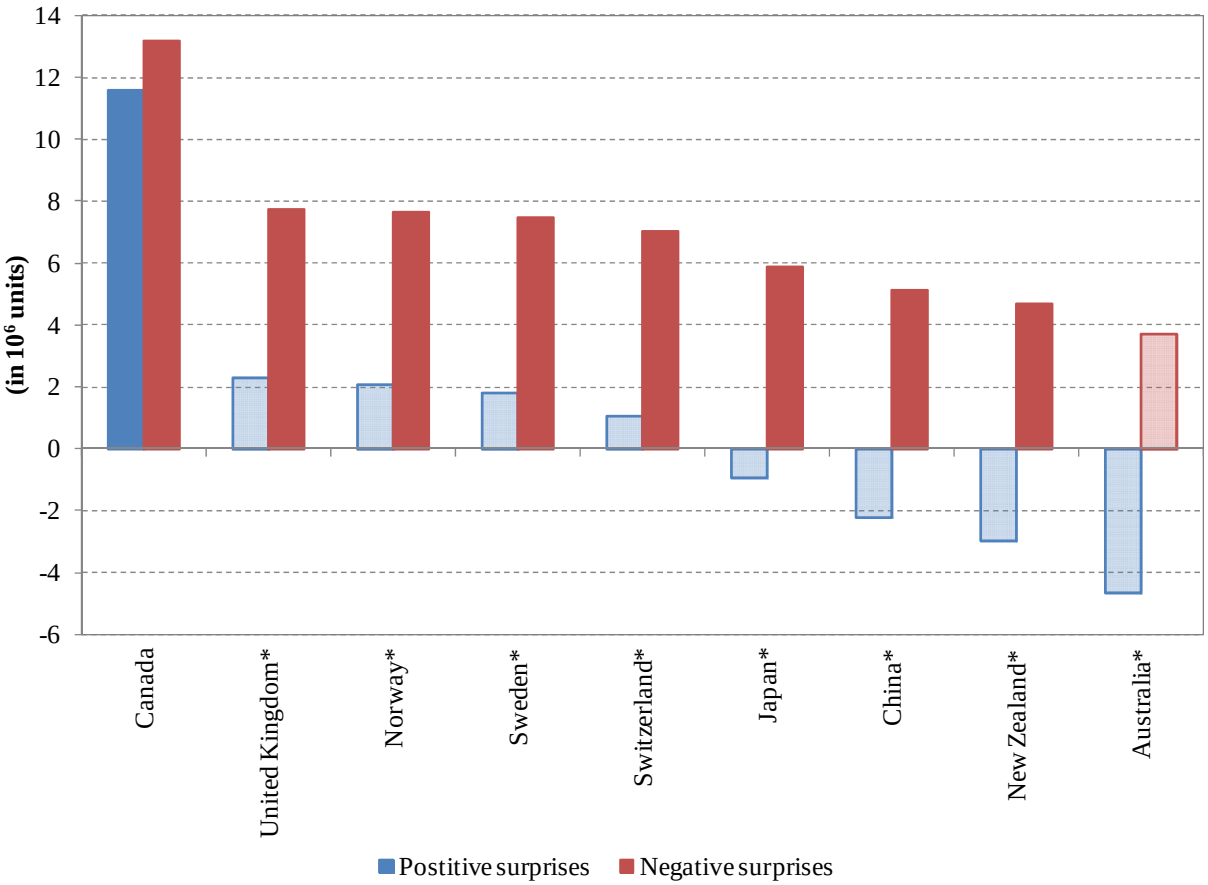
Note: Daily observations from January 2006 to December 2010. Positive figures denote stronger than expected economic activity. Source: Citigroup.

Figure 2: Magnitude of reaction to positive versus negative surprises by country



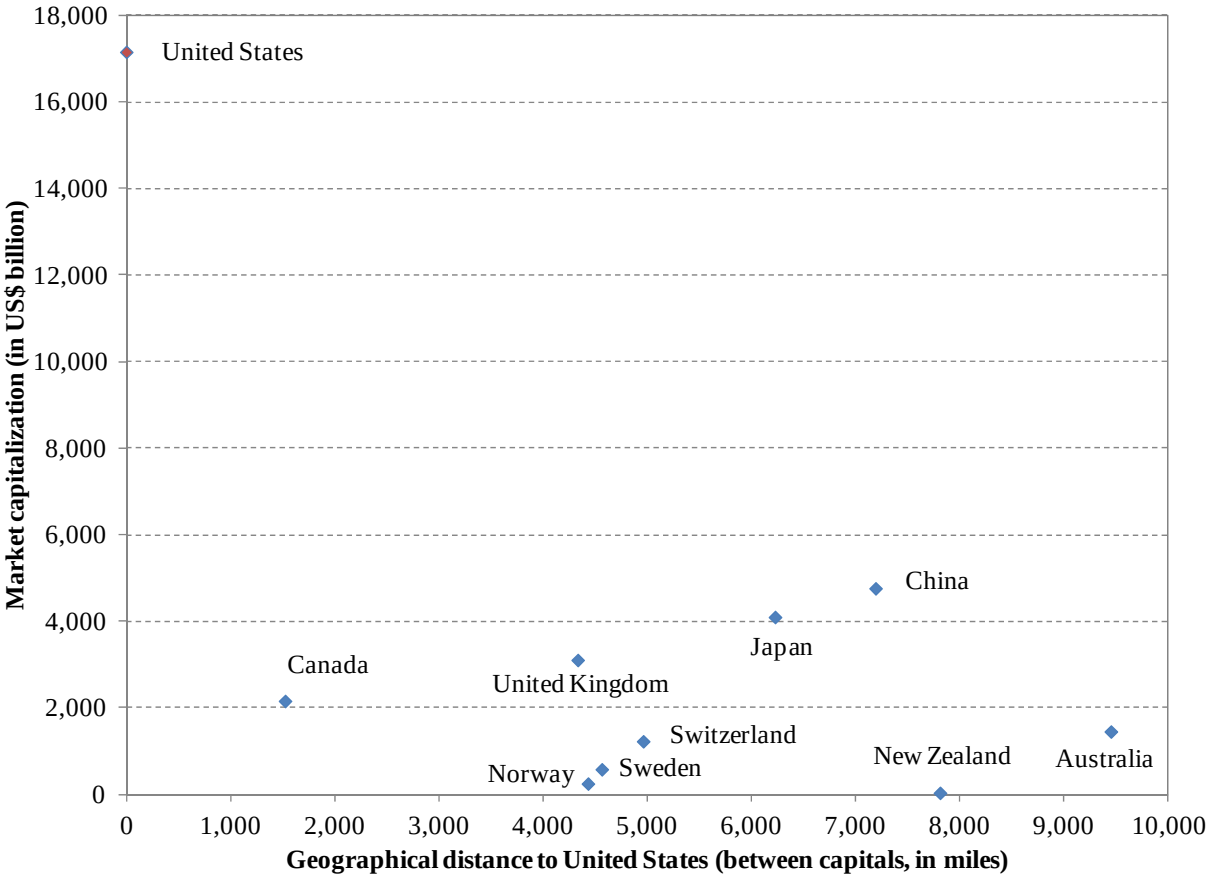
Note: Blue (red) columns refer to individual countries' semi-elasticity of attention with respect to positive (negative) surprise based on estimation output presented in Table 5. Non-solid colors denote that the height of the column is not statistically significantly different from zero at the 5% significance level. The symbol "*" by the country name denotes that the height of the blue column is statistically different from the height of the red column at the 5% significance level.

Figure 3: Robustness check – Magnitude of reaction to positive versus negative surprises by country, estimated excluding United States from sample



Note: Blue (red) columns refer to individual countries' semi-elasticity of attention with respect to positive (negative) surprise based on estimation output presented in Table 6. Non-solid colors denote that the height of the column is not statistically significantly different from zero at the 5% significance level. The symbol "*" by the country name denotes that the height of the blue column is statistically different from the height of the red column at the 5% significance level.

Figure 4: Market capitalization in 2010 versus geographical distance between country's national capital and Washington DC



Source: World Bank's World Development Indicators data set.

Table 1: Summary Statistics

	Attention allocation (Google SVI)				Economic surprise index				US net purchases of foreign stocks			
Country	**Mean**	**Std. Dev.**	**Min**	**Max**	**Mean**	**Std. Dev.**	**Min**	**Max**	**Mean**	**Std. Dev.**	**Min**	**Max**
Australia	5.61	1.88	2.88	16.97	28.72	42.84	-78.50	177.80	0.25	0.73	-1.48	1.83
Canada	17.50	4.99	9.76	41.69	18.99	63.23	-208.00	150.70	0.42	1.38	-3.23	3.77
China	17.93	12.66	6.90	172.58	26.02	60.05	-140.40	185.00	0.03	0.48	-0.93	3.03
Japan	10.69	6.19	4.17	62.58	-2.96	35.08	-86.50	80.80	-0.04	2.13	-7.38	6.04
New Zealand	1.22	0.52	0.00	3.01	-1.00	42.17	-114.80	91.40	0.00	0.04	-0.11	0.16
Norway	1.23	0.53	0.00	3.29	12.09	47.85	-70.40	158.50	-0.09	0.27	-0.74	0.49
Sweden	1.21	0.58	0.00	2.86	6.89	43.35	-78.90	94.40	-0.32	0.74	-3.05	0.69
Switzerland	2.05	0.62	0.90	5.60	3.11	87.96	-267.30	230.50	-0.10	0.47	-1.36	1.09
United Kingdom	15.51	5.47	7.68	48.00	10.21	44.95	-85.40	142.00	2.47	5.64	-9.99	16.89
United States	87.07	28.63	45.34	266.72	-2.01	44.89	-140.60	73.20	-	-	-	-
All countries	**16.00**	**26.68**	**0.00**	**266.72**	**10.01**	**54.29**	**-267.30**	**230.50**	**0.29**	**2.24**	**-9.99**	**16.89**

Note: time-series summary statistics for individual countries and panel summary statistics for whole sample. US purchases of foreign stocks measured in US$ billion. Sources: Google Insights for Search, Citigroup, and Treasury International Capital (TIC) System.

Table 2: Effect of attention on following period's US net purchases of foreign stocks

	(2.1)	**(2.2)**
Dependent variable:	*US net purchases of foreign stocks*	*US net purchases of foreign stocks*
attention	-0.705*	-1.131**
	(0.405)	(0.362)
stock market return	-1.717	-0.353
	(1.942)	(2.062)
stock market volatility	-7.386***	-5.730*
	(2.445)	(2.928)
distance	-0.408**	-0.612***
	(0.202)	(0.199)
language	1.139***	1.671***
	(0.417)	(0.377)
common law	1.355***	1.612***
	(0.420)	(0.412)
market capitalization	0.536**	0.746***
	(0.252)	(0.251)
GDP	0.374**	0.715***
	(0.190)	(0.177)
population	0.582**	0.774**
	(0.244)	(0.238)
land area	-0.358***	-0.502***
	(0.120)	(0.121)
Sample period:	Full sample (2006 to 2010)	Excluding 2008 financial crisis
Number of observations:	509	401
R^2	25.8%	32.4%

Note: Regressions also include monthly time effects, which are not reported in the table. Robust standard errors are given in parenthesis under the coefficients. The symbols "*", "**", and "***" denote that the individual coefficient is statistically significant at the 10%, 5%, and 1% significance level, respectively. The following variables are in natural logs: *attention*, (one plus) *distance*, *market capitalization*, *GDP*, *population*, and *land area*.

Table 3: Gravity model for attention allocation and effect of predicted and unpredicted attention on following period's US net purchases of foreign stocks

	(3.1)	**(3.2)**
Dependent variable:	*attention*	*US net purchases of foreign stocks*
predicted attention	-	0.720***
	-	(0.266)
unpredicted attention	-	-0.705*
	-	(0.405)
stock market return	-	-1.717
	-	(1.943)
stock market volatility	-	-7.386***
	-	(2.445)
distance	-0.315***	0.040
	(0.029)	(0.144)
language	0.800***	-
	(0.051)	-
common law	0.181***	1.096***
	(0.061)	(0.373)
market capitalization	0.261***	0.163
	(0.029)	(0.192)
GDP	0.348***	-0.122
	(0.029)	(0.151)
population	0.323***	0.122
	(0.026)	(0.145)
land area	0.004	-0.364***
	(0.011)	(0.121)
Number of observations:	516	509
R^2	91.2%	25.8%

Note: Regression (3.2) also includes time effects, which are not reported in the table. Robust standard errors are given in parenthesis under the coefficients. The symbols "*", "**", and "***" denote that the individual coefficient is statistically significant at the 10%, 5%, and 1% significance level, respectively. The following variables are in natural logs: *attention*, (one plus) *distance*, *market capitalization*, *GDP*, *population*, and *land area*.

Table 4: Effect of economic surprise and interaction with distance

	(4.1)	**(4.2)**
Dependent variable:	*attention*	*attention*
surprises	6.45×10^{-6}***	2.32×10^{-5}***
	(1.29×10^{-6})	(6.41×10^{-6})
surprises · distance	-	-2.05×10^{-6}***
	-	(7.89×10^{-7})
distance	-0.050***	-0.046***
	(0.003)	(0.004)
language	0.690***	0.688***
	(0.021)	(0.020)
common law	0.354***	0.354***
	(0.024)	(0.024)
market capitalization	0.363***	0.365***
	(0.016)	(0.016)
GDP	0.401***	0.399***
	(0.013)	(0.013)
population	0.291***	0.292***
	(0.012)	(0.012)
land area	0.027***	0.027***
	(0.006)	(0.006)
Number of observations:	2,451	2,451
R^2	95.0%	95.0%

Note: Regressions also include annual time effects, which are not reported in the table. Robust standard errors are given in parenthesis under the coefficients. The symbols "*", "**", and "***" denote that the individual coefficient is statistically significant at the 10%, 5%, and 1% significance level, respectively. The following variables are in natural logs: *attention*, (one plus) *distance*, *market capitalization*, and *GDP*, *population*, and *land area*.

Table 5: Effects of positive versus negative surprises and interaction with distance

	(5.1)	**(5.2)**
Dependent variable:	*attention*	*attention*
positive surprises	2.64×10^{-6}	7.43×10^{-5}***
	(1.77×10^{-6})	(1.46×10^{-5})
(*positive surprises*)·*distance*	-	-8.56×10^{-6}***
	-	(1.76×10^{-6})
negative surprises	9.86×10^{-6}***	1.54×10^{-5}***
	(1.41×10^{-6})	(4.73×10^{-6})
(*negative surprises*)·*distance*	-	-6.65×10^{-7}
	-	(5.94×10^{-7})
distance	-0.049***	-0.042***
	(0.003)	(0.004)
language	0.685***	0.682***
	(0.020)	(0.020)
common law	0.361***	0.363***
	(0.024)	(0.024)
market capitalization	0.366***	0.369***
	(0.016)	(0.016)
GDP	0.399***	0.393***
	(0.013)	(0.013)
population	0.293***	0.298***
	(0.012)	(0.012)
land area	0.028***	0.027***
	(0.006)	(0.006)
Number of observations:	2,451	2,450
R^2	95.0%	94.9%

Note: Regressions also include annual time effects, which are not reported in the table. Robust standard errors are given in parenthesis under the coefficients. The symbols "*", "**", and "***" denote that the individual coefficient is statistically significant at the 10%, 5%, and 1% significance level, respectively. The following variables are in natural logs: *attention*, (one plus) *distance*, *market capitalization*, and *GDP*, *population*, and *land area*.

Table 6: Robustness check – Effect of economic surprise and interaction with distance excluding United States from sample

	(6.1)	**(6.2)**
Dependent variable:	*attention*	*attention*
surprises	4.97×10^{-6}***	7.18×10^{-5}***
	(1.19×10^{-6})	(1.37×10^{-5})
surprises·distance	-	-7.98×10^{-6}***
	-	(1.69×10^{-6})
distance	-0.410***	-0.381***
	(0.012)	(0.014)
language	0.742***	0.734***
	(0.020)	(0.020)
common law	0.255***	0.263***
	(0.025)	(0.025)
market capitalization	0.262***	0.269***
	(0.016)	(0.016)
GDP	0.349***	0.345***
	(0.013)	(0.013)
population	0.355***	0.358***
	(0.011)	(0.011)
land area	-0.003	-0.004
	(0.005)	(0.005)
Number of observations:	2,190	2,190
R^2	93.8%	93.9%

Note: Regressions also include annual time effects, which are not reported in the table. Robust standard errors are given in parenthesis under the coefficients. The symbols "*", "**", and "***" denote that the individual coefficient is statistically significant at the 10%, 5%, and 1% significance level, respectively. The following variables are in natural logs: *attention*, (one plus) *distance*, *market capitalization*, and *GDP*, *population*, and *land area*.

Table 7: Robustness check – Effects of positive versus negative surprises and interaction with distance excluding United States from sample

	(7.1)	**(7.2)**
Dependent variable:	*attention*	*attention*
positive surprises	1.71×10^{-6}	7.68×10^{-5}***
	(1.54×10^{-6})	(1.71×10^{-5})
(*positive surprises*)·*distance*	-	-8.90×10^{-6}***
	-	(2.08×10^{-6})
negative surprises	8.05×10^{-6}***	5.12×10^{-5}***
	(1.34×10^{-6})	(1.71×10^{-5})
(*negative surprises*)·*distance*	-	-5.19×10^{-6}**
	-	(2.11×10^{-6})
distance	-0.408***	-0.380***
	(0.012)	(0.014)
language	0.738***	0.731***
	(0.020)	(0.020)
common law	0.262***	0.269***
	(0.025)	(0.025)
market capitalization	0.265***	0.272***
	(0.016)	(0.016)
GDP	0.347***	0.344***
	(0.013)	(0.013)
population	0.356***	0.359***
	(0.011)	(0.011)
land area	-0.002	-0.002
	(0.005)	(0.005)
Number of observations:	2,190	2,190
R^2	93.9%	93.9%

Note: Regressions also include annual time effects, which are not reported in the table. Robust standard errors are given in parenthesis under the coefficients. The symbols "*", "**", and "***" denote that the individual coefficient is statistically significant at the 10%, 5%, and 1% significance level, respectively. The following variables are in natural logs: *attention*, (one plus) *distance*, *market capitalization*, and *GDP*, *population*, and *land area*.