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The Dynamics of Investor Sentiment  
Interference in International Capital Transfers.

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# The Dynamics of Investor Sentiment Interference in International Capital Transfers.

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## **Abstract**

This paper presents a model to describe the manner in which international capital allocation decisions are colored by prevailing sentiment dynamics in an international context. To investigate this, the study assumes a country-specific and global formation of sentiment and various international capital flow variables in a 46-country panel-data setting from 1980-2014. The paper argues for, and finds evidence of, a greater susceptibility to international and country-specific sentiment levels in portfolio investment decisions over direct investment flows. The effect is found to be more pronounced during periods of pessimism, and amongst poor countries. This insight is extended to assess the impact of sentiment-driven capital allocation decisions on a range of financial and economic outcomes. These sentiment-rich capital flow effects on financial market performance are characteristic of sentiment-driven mispricing on a country-wide scale, in that they are increasing in magnitude and persistence, with limits to arbitrage.

**JEL Classification:** E70, E71, H30

**Keywords:** International capital allocation, Investor sentiment, Foreign Direct Investment, Foreign Portfolio Investment.

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As financial economics becomes more effective at explaining phenomena within financial and real markets, the discipline seeks to cast the net wider in terms of what is theoretically explicable - further than what perfect markets can explain. A clearer picture of the macro-effects of systematic individual-level irrationalities will enable such policy to better explain the economic workings of the world, and attribute these irrationalities to theoretically intuitive explanations. As such, as macro-economic policy delves ever deeper in search of systemic irregularities in financial markets, the complexity of financial markets themselves are overshadowed by that of the agents interacting within them. To better explain this, behavioral finance has explored the idea of an irrational investor, which posits an investor prone to the biasing influence of prevailing market sentiment and other irrationalities in its capital allocation decisions.

As investor sentiment gains legitimacy as an amorphous concept used to explain departures from strict rationality in financial markets, studies looking to understand its role are becoming increasingly broad. Ever since Baker & Wurgler (2006) produced a compelling quantification of investor sentiment, withstanding skepticism regarding underlying simultaneity with fundamentals, it has enabled studies on financial and real outcomes driven by investor sentiment. This paper presents an exploratory look into the dynamics of sentiment on a global scale and the degree to which international capital markets enable the influence of sentiment globally.

The paper will focus on two broad questions. The first looks to characterize the relationship between investor sentiment dynamics and international capital flows, globally. The second, builds on the first and looks at the relationship between sentiment-driven capital flows and the financial and tangible economic activity associated therewith. The paper examines the relationship between sentiment and a specific measure of international capital flows – the relative magnitude of foreign direct investment (FDI) flows as opposed to foreign portfolio investment (FPI) flows – as a product of, or transmission mechanism through which, sentiment functions on a global scale. Using a quarterly panel dataset of 46 countries from 1980-2014, the paper finds a significant and positive relationship between investor sentiment and the FPI/FDI spread. The paper's second empirical contribution is the evidence it presents to suggest that sentiment-rich capital flows are associated with inferior financial market performance, GDP and employment growth at the margin of high sentiment. The paper concludes that this spread variable is a component of international capital flows that is

particularly susceptible to investor sentiment. In defense of this behavioral explanation, the relationship is found to be more pronounced in the presence of limits to arbitrage and fundamental value opacity. In sum, through the influence of international capital dynamics on financial markets and the knock-on effects that this can produce in real economic outcomes, inefficient capital allocation decisions influenced by prevailing sentiment dynamics can be economically undesirable.

In Section 1, the paper summarizes the body of literature concerned with adapting insights on sentiment to contexts outside of a single market, as well as literature concerning international capital allocation decisions and the effects of capital transfers on economic outcomes. This literature forms the basis of the two hypotheses of this paper. Section 2 presents a theoretical model which justifies the usage of this FDI/FPI spread as a measure of sentiment-rich capital flows, using overconfidence and catering theory as the behavioral justifications for potential mispricing coming from either supply or demand dynamics. The theoretical model provides the framework necessary for the hypothesis test. The data and methodology used in the investigation are explained in Section 3, with a brief descriptive overview in Section 4. Section 5 presents a critical discussion on the findings of the paper, and Section 6 concludes.

## **1. Literature Review**

This section will briefly review behavioral finance literature relevant to this investigation before considering some of the theory surrounding international capital dynamics. The review will then characterize the difference between the two capital flow interest variables, which leads to the first hypothesis of this paper. Literature concerning the economic effects of international capital flows on real outcomes will inform the paper's second hypothesis.

### *Behavioral Finance and Foreign Investment Decisions*

Literature relevant to this investigation initially considers the efforts to disentangle measures of market exuberance from rational reasons for fluctuating demand for investment. Baker & Wurgler (2006) produced a theoretically and empirically compelling argument for using the component of a range of sentiment measures that runs orthogonal to fundamental market characteristics to develop a sentiment index. The degree to which the index identified mispricing in hard-to-value stocks with limited arbitrage opportunities moved the index beyond a neat empirical idea to a convincing quantification of mispricing, driven by market-wide sentiment. This index has subsequently been adopted as an accessible measure of mispricing

in US financial markets (Stambaugh, Yu & Yuan, 2012). Much of behavioral finance, however, has dedicated effort towards discovering the inferior outcomes produced by irrational investment decisions within a single market, such as over-confident management (Malmendier & Tate, 2005; Roll, 1986), individual investing behaviors (Barberis & Thaler, 2003; Lee, Schleifer & Thaler, 1991; Frazzini & Lamont, 2008) and the persistent irrationalities in the investment decisions of professional financial managers (Goyal and Wahal, 2008).

This discipline has produced a wealth of literature concerning investment decision irrationalities, both in terms of corporate governance and asset mispricing at a micro-economic or single-market context. When considering corporate finance applications of investor sentiment, Mclean & Zhao (2014) measured the real economic outcomes driven by investor sentiment effects on financial markets. In particular, they measured the effects of sentiment at the margin of drivers of real economic outcomes such as employment growth. When considering the character and dynamics of sentiment in a global context, an economic variable needs to enable the influence of sentiment as a facilitator of tangible outcomes or effects. Extending the scope of the Baker & Wurgler 2006 investigation, Baker Wurgler & Yuan (2012) produced a similar index for 6 countries, and suggested that international capital flows are the underlying transmission mechanism of global sentiment contagion.

International capital flows consist of a range of sub-categorizations, the most researched of which are FDI and FPI. Dunning (1998) developed a foundational framework of three main determinants of FDI decisions: i) *market-seeking* - capturing factors specific to target investment markets; ii) *resource-seeking*, which describes FOP inputs such as natural or human resources; and iii) *efficiency-seeking* motives, which describe the desirability of a foreign market in terms of efficiencies in taxes and unit labor costs amongst other relevant factors. A range of subsequent studies have looked for other determinants of such investment decisions and have tested the generalizability of this framework with mixed results. Insights into the determinants of FPI decisions have received less academic attention. Taylor & Sarno (1997) however, distinguished global push factors and country-specific pull factors as two distinct groups of determinants, which is important for the purposes of this paper's econometric approach.

Goldstein & Razin (2006) develop a framework which establishes a point of departure for this investigation regarding these two sources of international capital flows. Their framework holds

that direct investment, as opposed to portfolio investment (in which the investor has no control over the management of the firm), earns a higher return attributed to managerial efficiencies. It does, however, incur costs associated with the liquidity risks inherent in holding controlling positions in the investment. Extrication from a FDI position before maturity introduces a market-for-lemons scenario of informational asymmetry (Akerlof, 1970), which increases the cost of divestment. This issue means that such an investment decision is inherently less liquid than an FPI investment, and costlier in extrication, which implies that the burden of proof required to justify such a decision is higher than in the case of FPI. Therefore, due to proximity to management and a higher burden of proof inherent in a FDI investment decision, this particular form of capital flow is better informed in terms of the likelihood of failure of the investment and the expected future cash flows of the venture. Tong & Wei (2010) elaborate on this, asserting that historically, FDI investment projects have predominantly been conducted by multinational companies, whereas investment funds and smaller investors are more likely to engage in FPI investments. This is still largely the case; however, more recently, investment funds have been willing to engage in both forms of foreign investment. Pfeffer (2008) affirms and develops the idea of Goldstein & Razin (2006), suggesting that investors perceive the two investment channels as a tradeoff between liquidity and profitability. The author's prescriptive conclusion is that a combination of both channels allows sophisticated investors to enjoy the profitability of FDI positions, whilst the component of their investment in FPI positions can provide for future liquidity requirements.

### *Hypothesis 1 Formulation*

This literature, which characterizes and distinguishes these two types of international capital flows, provides two channels through which FPI flows may be more susceptible to international sentiment dynamics in comparison to FDI. Firstly, FDI investors are afforded a clearer picture of the fundamental value of the investment by virtue of their proximity to, and control over, the management of the firm. Secondly, the FDI investor demographic is comprised almost exclusively of well-informed financial professionals, managing sufficient capital to establish a controlling stake in an illiquid investment in a foreign market. This demographic is contrasted with individual FPI investors, complacent in their decision-making because of the scale of their investment and the relative agility of their investment position. These international investors, through the forces of globalization, are given increasingly autonomous access to international investment opportunities, thereby increasing the likelihood

of these flows capturing uninformed investment opportunities. These points segue into the first testable hypothesis of the paper.

### *Hypothesis 1*

*The spread between FPI and FDI capital flows is positively associated with international investor sentiment dynamics.*

This first hypothesis, whilst rudimentary, is a fundamental stepping stone to further research in international behavioral finance. To better understand how irrational capital flows affect changes, one must first identify the capital flows that are significantly associated with sentiment. Higher liquidity and informational asymmetry inherent in FPI flows imply a greater susceptibility to sentiment than FDI flows, and therefore, that the spread between the two varies positively with prevailing sentiment. This is reconcilable with the findings of Baker, Foley & Wurgler (2008) who imply that FDI flows can serve an arbitrage function in asset pricing discrepancies between countries in contexts where hedge funds would be ineffective.

### *International Economics*

Moving now into the realm of international economics, this review touches on theory around the source and recipient countries of capital transfers. When considering generalized facts regarding the effects of foreign inflows to recipient countries, outcomes such as domestic investment are often ambiguous (Feldstein, 1995). The evidence for heterogeneity in the ability of capital to foster economic growth is evident in the breadth of factors found to be influential. Factors such as volatility (Hannan, 2017), absorptive capacity in terms of marginal productivity of capital (Lucas, 1990), and, more specifically income (Blomstrom, Lipsey, & Zejan, 1994), and education (Borensztein, De Gregorio, & Lee; 1998): have been documented. Calvo & Mendoza (1999) identify non-fundamental herd-like behaviors amongst international investors in the presence of informational frictions. This literature provides a glimpse of the range of investigations which have attempted to identify and characterize growth-inducing capital inflows. This insight is important in understanding the specificity required to control for fundamental drivers of economic outcomes in a cross-sectional setting.

Baker, Greenwood & Wurgler (2009) provide a framework through which changes in investor demand can affect corporate finance decisions in the presence of three prerequisites: changing investor tastes, corporate opportunism, and limited arbitration. These combine to create an



explanation of how changes in the supply of capital can affect real outcomes in a market. With regards to supply-side effects, evidence for market timing behavior from managers in their investment decisions can be found in persistent capital structures (Baker & Wurgler, 2002). Perhaps more strongly, evidence for this can also be found in anonymous survey data amongst managers, in the research of Graham & Harvey (2002). The practice of catering to investor tastes results in investment decisions informed by considerations outside of the NPV of investment opportunities. This logically produces inferior investment performance. Evidence of irrational behavior from both sides of the investment decision and the subsequent effect on market outcomes provides a foundation for the second research question of the paper.

### *Hypothesis 2 Formulation*

Three central ideas are drawn from the literature above in the formulation of Hypothesis 2. Firstly, the literature concerning the economic benefits accruing to both source and recipient countries of international capital transfers is mixed. Secondly, the demand for international investment opportunities is able to influence corporate finance decisions through supply effects which are susceptible to the influence of changing investor tastes. Thirdly, the supply of investment opportunities caters to the prevailing sentiment of investors. These three ideas inform an expectation that sub-optimal performance in both source and recipient countries results from international capital flows conditioned on sentiment. The second hypothesis of the paper is as follows.

### *Hypothesis 2*

*A positive spread between FPI and FDI flows represents sentiment-driven inefficient capital allocation decisions which results in sub-optimal market and real economic outcomes.*

This hypothesis develops upon insight from the World Bank Global Development Finance Report (1998) which discovers that the volatility of international capital flows constitutes an obstacle for domestic recipients in translating foreign investment into economic growth. This is particularly the case in terms of the divestment decision. The hypothesis also draws on insights from the findings of Lucas (1990), who observed heterogeneity in the marginal productivity of capital between countries, which affects their ability into translate investment spending into economic growth. In this context, this paper is attempting to identify and characterize any heterogeneity in marginal productivity of capital between these two sources.

With a clear understanding of the focus of this paper and the literature which led to these two hypotheses, a structure within which to organize the empirical investigation is required. This is necessary to isolate the relationship of interest and produce an empirical approach capable of falsifying the hypotheses established above.

## 2. Theoretical Model

The model considers firm-level interactions, which will be aggregated into country-specific stylized facts for the purpose of empirical study. An investment opportunity in a foreign country receives two sources of capital flows, assumed here to broadly represent two different types of investors: direct and portfolio investors. This is not an exhaustive categorization of international capital flows, and Balance of Payment Capital Accounts include items such as bank loans, financial derivatives and reserve assets amongst others. This paper has chosen these two flows for three reasons: they are a significant portion of international investment activity, they are similarly explained by fundamental explicators, and they have sufficient variation over time.

For simplicity, the model assumes country  $i$  contains two types of international investors who are required to decide whether they would like to invest their capital in a foreign opportunity or save it domestically. The first category ( $K_i$ ), represents investors from country  $i$  who will invest in country  $j$  through FDI flows, and will therefore maintain a controlling interest - an equity stake of 10% or more - in the management of their investment.  $k_i$  represents FPI investors, who are inherently different from  $K_i$  in that they are not afforded control over the management of the investment. Portfolio investors are unable to observe the cash flows of the investment and are forced to make an approximation in relation to the market price of the investment, which informs the quantity of capital that they provide to the investment. Incorporating behavioral nuance into the model, this approximation is influenced by prevailing country-specific investor sentiment ( $\delta$ ).  $K_i$  investors, due to the nature of their involvement in the foreign country, experience greater frictions and investment rigidities than  $k_i$  investors, whose positions are more agile in divestment (Goldstein & Razin, 2006). The model, developing on the observations above, is behavioral in that there are asymmetric informational forces at work.

Mathematically, this entails the formation of supply and demand functions which incorporate sentiment into the capital allocation decision. Sentiment influences these two perspectives through two different channels. From the perspective of the source-country, investors' demand for foreign investment positions is driven by their appreciation of fundamental factors which are distorted by prevailing sentiment dynamics. The destination country supplies investment opportunities that are a function of fundamental factors with the potential to include sentiment-biasing influences as a form of catering theory adapted from the insights of Baker, Ruback & Wurgler (2007).

*Outflows: Demand for Foreign Investment*

Country  $i$  represents a model source-country for international capital flows. Investors in country  $i$  make capital outflow decisions, also referred to as the demand for international investments. When considering the decision to invest in a foreign country from the perspective of a domestic investor, a function of the determinants of demand for international investment positions provides the requisite theoretical structure, and clarifies the distinction identified earlier in terms of the two sources of capital flows. We create individual capital flow functions which are then aggregated to create a demand for international sentiment function.

$$FDI_{i(out),t} = K_{i,t}(\phi_{j,t} - P_{j,t}) \quad (1)$$

$$FPI_{i(out),t} = k_{i,t}((\phi_{j,t} + \delta_{i(i),t}) - P_{j,t}) \quad (2)$$

$$Q_{D:t} = k_{i,t}((\phi_{j,t} + \delta_{i(i),t}) - P_{j,t}) + K_{i,t}(\phi_{j,t} - P_{j,t}) \quad (3)$$

Equation 1 outlines the FDI function for investors in country  $i$ , which this paper assumes to be exclusively rational and therefore immune to the influence of sentiment in their capital allocation decision. FDI is a function of the number of potential FDI investors ( $K_{i,t}$ ), as well as the NPV of the investment opportunity in country  $j$  ( $\phi_{j,t} - P_{j,t}$ ). The model uses this NPV term to represent a theoretical conception of fundamental determinants of foreign investments, which in reality extend beyond just market prices and fundamental value.

The pool of potential FPI investors ( $k_{i,t}$ ) in this model are assumed to include an irrational or sentiment-susceptible component. FPI flows are similar to FDI flows, with the exception of a

sentiment-biasing term -  $\delta_{i(i),t}$ . This term represents the prevailing sentiment in country  $i$ , as observed by country  $i$  investors. Total demand for international investment opportunities ( $Q_{D:t}$ ), an aggregation of these two sources of capital, is therefore also a function of sentiment as FPI flows are not exclusively a function of NPV considerations. During periods of investor exuberance, when sentiment is high, portfolio investors seek greater returns as they underestimate the likelihood of adverse outcomes in riskier investments. In order to service this demand, they turn to international investment opportunities. Equation 4 outlines the positive relationship between local sentiment and the demand for investment opportunities in foreign countries over time.

$$Q_{D:t+1} - Q_{D:t} = k_{i,t+1}((\phi_{j,t+1} + \delta_{i(i),t+1}) - P_{j,t+1}) - k_{i,t}((\phi_{j,t} + \delta_{i(i),t}) - P_{j,t}) + K_{i,t+1}(\phi_{j,t+1} - P_{j,t+1}) - K_{i,t}(\phi_{j,t} - P_{j,t}) \quad (4)$$

Equation 4 does not provide an opportunity to identify and measure the direct influence that sentiment has in affecting international capital allocation decisions, which limits its tractability. To develop a powerful empirical estimation tool which isolates sentiment and its effects on capital flows, simplification is necessary. This is achieved by differencing the FPI and FDI flows over time. For the sake of simplicity, the model assumes a negligible change in net demand for international investments, and potential international investors ( $\overline{k_{i,t}}$ ,  $\overline{K_{i,t}}$ ), in the short run. Using these assumptions, we arrive at the expression which forms the basis of this paper and can be represented as follows:

$$\left(\frac{dQ_{D:t}}{dt}\right) [FPI_{i(out)}, - FDI_{i(out)}] = \Delta(k_{i,(t+1),t} \delta_{i(i),(t+1),t})$$

The dynamics of this relationship can be understood more intuitively in the alternate specification below:

$$\Delta FPI_{i(out),(t+1)-t} - \Delta FDI_{i(out),(t+1)-t} = \Delta \delta_{i,(t+1)-t} \quad (5)$$

This specification provides for a distillation of the interplay between sentiment-susceptible capital outflows and sentiment. In the interests of a fluent narrative, the LHS of this expression will hereafter be referred to as Sentiment-Susceptible Outflows (SSO), and will form an integral part of the empirical investigation to follow. As sentiment improves in the domestic economy, overconfident investors underestimate the likelihood of adverse investment outcomes. They seek investment opportunities with higher expected returns, which manifests

in the demand for international investment positions and subsequent SSO's. Conversely, in periods of market pessimism, investors are tempted to withdraw their overseas investment positions and consolidate their exposures in their domestic economy. This could, potentially, be attributable to a strengthening of the home bias, during periods of market volatility. For a graphical appreciation of the differing nature of these two sources of investment flows, Appendix Item 2 depicts the two separate capital account flows and the difference of the two which becomes our SSO variable.

### *Inflows: Supply of Foreign Investment*

Let us consider country  $j$  as a model source-country for foreign capital investments. The framework here attempts to understand the behavior of recipients of foreign capital inflows who provide investment opportunities for foreign investors, and the dynamics of these inflows in terms of the local investor sentiment. The model assumes asymmetrical information and catering behavior in the supply of investment opportunities, to incorporate the potential for behavioral interactions within the supply-function.

Country  $j$ , as the recipient country, supplies investment opportunities for foreign capital according to the following function.

$$FDI_{j(in),t} = K_i((P_{j,t} - \phi_{j,t})) \quad (6)$$

$$FPI_{j(in),t} = k_i((P_{j,t} + \delta_{j(i),t}) - \phi_{j,t}) \quad (7)$$

Here we understand FDI flows into country  $j$  as a product of the potential FDI investors in country  $i$  ( $K_i$ ), and the NPV of investment opportunities in country  $j$ . FPI flows into country  $j$  are received with imperfect information about the sentiment effects in the source-country  $i$ , by suppliers in country  $j$ . The suppliers of investment opportunities, attempt to cater to the susceptibility of FPI investors to the influence of sentiment, in the price that they offer exposure in country  $j$  for the capital inflows from country  $i$ . If they are aware of the overvaluation of investment opportunities from investors in country  $i$ , rent-seeking suppliers in country  $j$  will attempt to capture these economic profits by offering a higher market price ( $P_{j,t} + \delta_{j(i),t}$ ). Simply, this translates to suppliers attempting to charge foreign investors as much as they are willing to pay. To facilitate such rent-seeking behavior price-discrimination is required to

ensure that irrational foreign investors are not exposed to the prevailing market price in country  $j$ . To achieve this, consider foreign portfolio investments in assets which are not exposed to public markets, such as non-controlling private equity positions, OTC traded assets and closed-end mutual funds amongst others.

In equation 8, “ $b$ ” captures the price elasticity of supply of international investment, and is defined as:  $0 < b \leq 1$ . This represents the degree to which investment opportunities are able to cater to the capital flowing into the country. Applications of the supply function in this paper, assume perfect elasticity ( $b=1$ ).  $\delta_{j(i),t}$  represents the perception of suppliers of capital in country  $j$  of the prevailing sentiment in country  $i$ . The implication of this is that the investment opportunities available in country  $j$  are positively related to the manner in which irrational investors in country  $i$  experience sentiment within country  $i$ , and the degree to which suppliers of investment opportunities in country  $j$  interpret this effect and cater to it.

$$Q_{s:t} = b \cdot k_{i,t}((P_{j,t} + \delta_{j(i),t}) - \phi_{j,t}) + b \cdot K_{i,t}(P_{j,t} - \phi_{j,t}) \quad (8)$$

Expression 9 represents the marginal changes in foreign capital flows from FPI and FDI sources into country  $j$ 's marginal behavior over time, and allows a better understanding of the relationship between capital flows and sentiment over time.

$$Q_{s:t+1} - Q_{s:t} = k_{i,t+1}((P_{j,t+1} + \delta_{j(i),t}) - \phi_{j,t+1}) + K_{i,t+1}(P_{j,t+1} - \phi_{j,t+1}) - [k_{i,t}((P_{j,t} + \delta_{i(j),t}) - \phi_{j,t}) + K_{i,t}(P_{j,t} - \phi_{j,t})] \quad (9)$$

As was the case earlier, this time-differenced approach fails to provide an empirically workable solution. However, the difference between the two capital flows over time isolates the predictive power of sentiment in driving international capital flows.

$$\left(\frac{dQ_{s:t}}{dt}\right) [FPI_{j(in)}, -FDI_{j(in)}] = \Delta(k_{i,(t+1)-t}\delta_{j(i),(t+1)-t})$$

This expression illustrates that sentiment-driven capital inflows into country  $j$  can be understood as the difference between FPI and FDI flows over time, and is driven by changes

in the destination countries perception of source-country sentiment over time. This is represented intuitively below:

$$\Delta FPI_{j(in);(t+1),t} - \Delta FDI_{j(in),(t+1)-t} = \Delta \delta_{j(i),(t+1),t} \quad (10)$$

Expression 10 is similar to expression 5, and represents the flow of sentiment-rich capital into the destination country  $j$ , and will hereafter be referred to as “sentiment susceptible inflows” or SSI. This identity holds that the difference between the FPI and FDI flows can be exclusively attributed to changes in sentiment during the period. The demand for international investment opportunities is a function of sentiment within the domestic economy, whereas the supply of portfolio investment opportunities is a function of the destination country’s expectation of the sentiment effects within the source-country, implying that this side of the market has a more detached relationship with sentiment dynamics.

### *Equilibrium*

To understand the behavior of these two sources of capital at equilibrium, we equate supply and demand from the perspective of country  $j$ . This section of the model attempts to describe the intersection of foreign investment demand from country  $j$ , the supply of investment opportunities in country  $j$ , and the financial and real outcomes resulting from this. Thus we consider two potential equilibrium outcomes, by holding  $Q_{S:t} = Q_{D:t}$ .

$$k_{i,t}((P_{j,t} + \delta_{j(i),t}) - \phi_{j,t}) + K_{i,t}(P_{j,t} - \phi_{j,t}) = k_{i,t}((\phi_{j,t} + \delta_{i(i),t}) - P_{j,t}) + K_{i,t}(\phi_{j,t} - P_{j,t}) \quad (11)$$

### *Equilibrium Pricing*

There are two channels through which rational equilibrium-pricing can be achieved within this framework. The first is when  $\delta_{i(i),t} = \delta_{j(i),t} = 0$ , where sentiment is neutral. The second,  $\delta_{i(i),t} = \delta_{j(i),t} \neq 0$  is where the degree to which sentiment in country  $i$  drives capital outflows will be offset perfectly by catering behavior in the supply of investment opportunities in the destination country  $j$ , which is informed by their expectation of the effects of sentiment levels in country  $i$ . Our competitive equilibrium price is derived as follows:

$$(P_{j,t}) = \frac{2k_{i,t}(\phi_{j,t}) + 2K_{i,t}((\phi_{j,t}))}{(2k_{i,t} + 2K_{i,t})} \quad (12)$$

$$P_{j,t}^* = \phi_{j,t} \quad (13)$$

Under these circumstances, with perfect competition assumptions such as frictionless international capital mobility, equilibrium prices will equal the fundamental value of the investment and result in no distortion in terms of financial or real outcomes.

### *Equilibrium Mispricing*

Assume that the degree to which sentiment drives capital flow decisions disproportionately affects outflow decisions as opposed to inflow decisions ( $\delta_{j(i),t} \neq 0$  &  $\delta_{i(i),t} \neq 0$ ). Intuitively, one could expect this to be the case through two different channels. The first assumes heterogeneity in the perception of sentiment across investors in different countries: ( $\delta_{j(i),t} \neq \delta_{i(i),t}$ ) - despite evidence for a global conception of investor sentiment (Baker, Wurgler & Yuan, 2012). Secondly, prevailing market sentiment of the source-country is likely to have a stronger impact on investment decisions than the same sentiment observed by a foreign investor looking to demand investment into this country: ( $\delta_{i(i),t} > \delta_{j(i),t}$ ).

$$k_{i,t}((P_{j,t} + \delta_{j(i),t}) - \phi_{j,t}) + K_{i,t}(P_{j,t} - \phi_{j,t}) = k_{i,t}((\phi_{j,t} + \delta_{i(i),t}) - P_{j,t}) + K_{i,t}(\phi_{j,t} - P_{j,t}) \quad (14)$$

$$P_{j,t}^* = \frac{k_{i,t} \left( (2\phi_{j,t} + \delta_{i(i),t} - \delta_{j(i),t}) \right) + 2K_{i,t}(\phi_{j,t})}{(2k_{i,t} + 2K_{i,t})} \quad (15)$$

$$P_{j,t}^* = \frac{k_{i,t} \left( (2\phi_{j,t} + \delta_{i(i),t} - \delta_{j(i),t}) \right) + (2\phi_{j,t})(k_{i,t} + K_{i,t})}{(2k_{i,t} + 2K_{i,t})}$$

$$P_{j,t}^* = \frac{k_{i,t}(\delta_{i(i),t} - \delta_{j(i),t})}{(2k_{i,t} + 2K_{i,t})} + \phi_{j,t} \quad (16)$$

Expression 17 provides an insight into the distortions on asset prices caused by disproportionate exposures to sentiment between countries. There are two distorting dynamics at work, either interchangeably or in tandem. Demand-side distortions occur when  $\delta_{i(i),t} \neq 0$ , which will cause a change in the equilibrium price level. A supply-side distortion affects equilibrium pricing in that suppliers attempt to anticipate sentiment-effects in the source-country and capture economic rents from this ( $\delta_{j(i),t} \sim \delta_{i(i),t}$ ). Through this explanation, we suspect that sentiment-susceptible capital flows are likely to produce inefficient capital



allocation outcomes, which could translate into inferior performance of financial markets and real performance of economies.

### *Model Critique*

The model assumes that there is an aspect of irrationality within demand decisions through sentiment-related demand for riskier assets, whilst supply of investment opportunities caters to the sentiment-driven distortions driving demand. This explains why two different sentiment effects exist within the imperfect equilibrium ( $\delta_{i(j),t} - \delta_{j(j),t}$ ). This indicates that the model considers irrationality to be a component of both supply and demand. Alternatively, assuming that supply decisions within destination countries are driven exclusively by fundamental considerations:  $Q_{s:t} = b \cdot k_{i,t}(P_{j,t} - \phi_{j,t}) + b \cdot K_{i,t}(P_{j,t} - \phi_{j,t})$ , equilibrium price would therefore be a function of sentiment-biasing effects on demand exclusively  $P_{j,t}^* = \frac{k_{i,t}(\delta_{i(j),t})}{(2k_{i,t} + 2K_{i,t})} + \phi_{j,t}$ . The same would be the case if we assumed that demand for investment opportunity is impervious to sentiment-effects whilst the supply of investment opportunities is influenced by the destination economies impression of sentiment within their own, or other, countries. Whilst this model has created an *ex ante* characterization of two potential avenues for sentiment effects in capital allocation decisions, the conceptually most appealing avenue is a combination of relative sentiment levels in source and destination country.

This model is simplistic in assuming that irrational investors inform their decisions with fundamentals in combination with sentiment from only the source or destination country. This distinction between supply and demand perspectives is a fiction necessary to be able to test inflows and outflows separately. The decision is more likely to be a combination of relative sentiment within both the source and destination country. Appendix Item 4 presents a more thorough model allowing for directionality of capital flows and source-destination sentiment considerations. Data availability, which will be addressed in later sections of the paper, does not provide for the tracking of capital flows from source to destination country, or endogenous cross-sectional sentiment heterogeneity which causes the full model to produce empirically untestable outcomes.

Taking this a step further, there is a possibility that capital allocation decisions are made by an investor who resides in neither the source or destination country. The decision is then conditioned on their perception of relative sentiment dynamics in two different foreign

countries, and on sentiment levels in the investor's country of residence. This moves the model beyond a dichotomous decision problem. Ultimately, capital allocation decisions could be represented as a function of the relative value of destination-country sentiment, and global country sentiment (here presented as  $\delta_G$ ). The demand for international investment opportunities which are susceptible to sentiment could therefore be represented as:

$$\Delta FPI_{i(out),(t+1)-t} - \Delta FDI_{i(out),(t+1)-t} = \Delta \delta_{i,(t+1)-t} - \Delta \delta_{G,(t+1)-t} \quad (17)$$

Due to the data available to this investigation, the empirical tests of the supply-catering effects are unable to measure the sentiment of the source-country, which is responsible for the capital inflow experienced by country  $j$  ( $\Delta \delta_{j(i),(t+1),t}$ ). For this reason we consider a global conception of investor sentiment, in line with the Baker, Wurgler & Yuan (2012) understanding of a globally pervasive sentiment effect. This is especially relevant to the SSI component of the empirical investigation.

### 3. Methodology

My empirical investigation assembles a panel dataset of international capital flows from the Balance of Payments accounts, sentiment data, as well as country-specific demographic information of 46 countries across a time-period of 1980-2016 at a quarterly frequency. This specific scope of data focus provides adequate breadth of countries to ensure external validity, yet provides depth necessary to facilitate descriptive insights to better characterize international capital flows and their interactions with international investor dynamics. A fixed-effects model provides for a within-estimation, controlling for unobserved cross-country heterogeneity, best-suited to characterize the country-specific relationship between sentiment and capital flows. This is especially relevant in an investigation as broad as this, where the potential for spurious determinants of financial outcomes driving results is high.

The appropriateness of this model is however, conditional on an assumption of time-invariance of inter-country heterogeneity across my sample. Intuitively, this assumption appears tenuous - given the long period of the sample (36 years) and the ever-changing structural capital-dynamics globally. To test this assumption, a dummy variable was included to represent the then 11 members of the European Economic Area from July 1990, when a commitment was

made to remove all barriers to free capital markets within the Union. This policy intervention provides a litmus test for variation in between-country unobservables through time, as liberating capital markets between these countries in the sample is likely to cause an uncontrolled-for variation in the cross-country nature of capital relationships. The dummy was unable to find significance within the main empirical test of hypothesis 1. This then affirms the necessary assumption of acceptably time-fixed unobservable between-country heterogeneity, and justifies the use of our fixed effects estimation model. A more formal justification for the choice of estimator was provided by a significant Hausman Test result ( $p < 0.01$ ) which is explained later.

### *Quantifying Sentiment*

Of crucial importance to an investigation of this nature is a characterization of investor sentiment specific to a country. Attempts to introduce the insights of Baker & Wurgler (2006) to financial economies outside of the US have been attempted (Baker, Wurgler & Yuan, 2012). However, data paucity issues preclude such a rigorous approach for the breadth of countries considered in this investigation. For this reason, the paper borrows the approach of Montone & Zwinkel (2017), and treats sentiment as a form of global prevailing sentiment which permeates other countries. This draws on evidence for the positive effect of financial development for growth in externally dependent firms (Rajan & Zingales, 1998). The susceptibility of international countries to global sentiment effects is proxied with the degree of financial development of the specific country.

Aware of the imperfections inherent in attempting to estimate investor sentiment, the paper makes use of two configurations of sentiment. The first specification treats the Baker & Wurgler (2006) sentiment index (hereafter “BWSENT”), adjusted to a quarterly frequency, as a global sentiment measure. It assumes that all countries are equally exposed to this sentiment, which despite being a simplistic interpretation of international sentiment dynamics is acceptable without another rich country-specific quantification of investor sentiment. The second specification interacts BWSENT with a survey index which measures the degree of development of a country’s financial markets. This methodology draws from the work of Montone & Zwinkels (2017), who hold that the degree to which global investor sentiment impacts individual countries is a function of the degree to which they are exposed to international financial dynamics. This exposure is here proxied using the development of the country’s financial market. The Financial Development Index used here is provided by the IMF

and is created from prodigiously broad range of sources<sup>2</sup> to create a truly holistic and nuanced understanding of financial development. This interaction between BWSSENT and the Financial Development Index is the central sentiment interest variable of this investigation. However survey data and other quantifications of sentiment are tested to ensure that the relationships of interest are not anomalously specific to this sentiment quantification methodology. This investigation also attempted to incorporate the index of Baker, Wurgler & Yuan (2012) who extended the theory of the original BW (2006) index to a limited sample of other international countries. This index is also only available for a limited time period (1980-2005) at a yearly frequency across 6 countries - thwarting efforts to include it even as a robustness check.

### *Capital Flows*

To further understand the capital flow dynamics at play, the Balance of Payments accounts include the acquisition of Direct and Portfolio investment positions as well as the incurrence of Direct and Portfolio liabilities. Simply, the accounts capture for each country, the flows of capital received by the country from foreign investors, as well as the flows of capital sent overseas into foreign investment positions. Because capital flows are from Balance of Payments accounts of individual countries, during quarters in which there was a net decrease in the size of foreign direct or portfolio capital ownership by domestic citizens, the quarter returned a negative figure. The paper created two variables which capture the difference between FDI and FPI flows either into or out of a country during the quarter, which are intended to replicate the LHS of mathematical expressions (5) and (10). These variables capture the discrepancy in the two sources of capital, and assumes high levels of this variable to be sentiment-susceptible capital flows, which is foundational to the theoretical model of this paper. These sentiment-susceptible flows are considered in the paper in terms of outflows (SSO) or inflows (SSI).

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<sup>2</sup> Relevant here is the work of Svirydzenka (2016) who details the methodology used to construct the Index, financial development is understood to be a combination of: “*depth* (size and liquidity of markets), *access* (ability of individuals and companies to access financial services) and *efficiency* (ability of institutions to provide financial services at low cost and with sustainable revenues, and the level of activity of capital markets)”

*Time Dynamics*

The breadth of the issues to be dealt with in this paper, has pushed its econometric objectives towards cautious generalized relationships. This study aims to establish broad relationships and dynamics instead of isolating a single linkage and attempting to defend a causal relationship. Therefore, the paper makes use of two specifications of sentiment in parallel as well as including a range of different lag periods between sentiment and capital responses as the standard regression format. The sample time-period (1980Q1-2014Q4) while providing sufficient length to rationalize periods of extreme capital flows which in a shorter samples could potentially skew the generality of the sample, also disproportionately represents certain countries who have reported capital flow data since 1980. For this reason our main empirical regressions - which have sufficient observational strength to prioritize generality - considered flows after 2000 where all countries in the sample received approximately equal representation. For a graphic depiction of the three interest variables and their dynamics over time, consult Appendix Item 2.

#### **4. Descriptive Statistics**

Fortuitously, the OECD provides a fairly rich dataset of international capital flows, which has enabled this investigation to balance the interests of external validity with the depth of variables necessary to unpack subtler relationships across this setting. SSI returns a positive average across the sample. This implies that on average, the sample of countries has received greater inflows in the form of portfolio investment. Interestingly, SSO is negative, implying that the demand for foreign investment was driven to a greater degree by direct investment flows across the sample. Upon further investigation, it was discovered that this result was largely driven by periods of significant FDI investment across the sample, which is highly representative of developed economies who best exploited opportunities abroad when globalizing influences liberated international capital movements.

**Panel 1: Summary Statistics**

Table to present the Mean Standard Deviation, range and number of observations for the interest variable of this investigation. The first four variables are sourced from the Balance of Payments Accounts. They are denominated in USD millions and were sourced from the OECD database. SSI and SSO is the difference of these two variables as represented algebraically. BWSSENT is available from <http://people.stern.nyu.edu/jwurgler/> where three monthly observations were averaged to create a quarterly frequency variable. Financial Development and Financial Efficiency are yearly survey variables which were sourced from the IMF databank. Svirydzienka (2016), details the methodology of the construction of these indices. The Confidence Indicator Survey variable provides qualitative short-term economic prospects per country at a yearly frequency, data were not available across the full range of countries in the full sample, which relegated this variable to a robustness check as another proxy for investor sentiment. All variables are available at a quarterly frequency other than those mentioned explicitly.

	Mean	SD	Min	Max	N
$\Delta FPI_{(out),t}$	8620.477	22360.67	-95212.41	401142.5	3611
$\Delta FPI_{(in),t}$	8341.868	21705.16	-99799.93	260384.9	3611
$\Delta FDI_{(out),t}$	7779.938	23192.5	-164911.4	221647	3577
$\Delta FDI_{(in),t}$	11422.19	33707.94	-146760	393364	3577
$\Delta FPI_{(in),t} - \Delta FDI_{(in),t} / SSI$	3008.276	33075.87	-329890.4	323483	3577
$\Delta FPI_{(out),t} - \Delta FDI_{(out),t} / SSO$	-917.5141	26355.02	-309034.2	151097	3577
Financial Development	0.4796281	0.2326828	0	1	6300
Financial Efficiency	0.3794024	0.274095	0	1	6300
Exports Growth	1.857554	5.102585	-44.22948	59.33875	5320
Imports Growth	1.754726	4.972293	-36.0049	35.62809	5320
BWSSENT	0.2587047	0.6803497	-0.856437	2.552292	6435
BWSSENT*(Financial Development)	0.0964378	0.3535594	-0.8311476	2.285083	6300
Confidence Index Survey Data	0.5236483	19.98585	-72.05	81.5	1668
Employment Growth	0.0855526	0.9200598	-11.54269	9.233552	2630
GDP Growth	1.374323	1.531106	-13.09667	24.74017	5346
Stock Performance	3.23386	12.30794	-71.23637	99.99976	5172

*Cross-sectional dynamics*

From the outset, large heterogeneity across countries was expected, which can be observed in Appendix Item 1. For this reason a broad sample is required to assume any form of generality in estimating relationships - although this variation across countries is likely to present an obstacle to estimating clean relationships. This between-country variation explains the decision of many empirical papers to restrict the scope of their investigation to a single country or

market. In the tradeoff between empirical control and external validity, this paper opts for broad generality.

### *Longitudinal dynamics*

The dynamics of this paper's interest variables across time can be found in Appendix Item 2. Whilst there are numerous interesting idiosyncratic issues within the time-period of this study, an interesting observation worth noting concerns the increase in volatility of capital flows and sentiment over time. As international capital transfers have undergone liberalization through progressive politics, technology, and other globalization forces - the scale of international capital transfers both in terms of FPI and FDI have increased, increasing the difference variable volatility. The increased volatility of sentiment over time is primarily attributable to the variable specification methodology. Much of the increase in volatility of sentiment across the time-period is due to increases in Financial Development across the countries. This increases steadily over time until 2007, where the measure plateaus. This observation, despite being the product of an exogenously created interaction term, reflects the increased exposure individual countries experience by virtue of their financial development and exposure to global financial markets.

It is also important to note the degree to which the inflow variable mirrors outflows; this is particularly the case where FDI sources are concerned. The reason for this is that every capital outflow recorded by a source-country must be matched with an inflow in a destination country. As the sample does not control for all of the potential capital destinations in existence (46 countries in the sample), there will be no perfect overlap. The sample is strongly biased in favor of developed large economies who are responsible for an overwhelming portion of FDI flows globally. This explains the narrow spread in average outflows and inflows in the FDI flows.

The descriptive analysis has shed light on the significant variation across time and country within the sample. This is useful in a panel data setting when unpacking empirical estimations to ensure that they are adequately representative.

## **5. Results**

The results of this paper will begin with estimations of hypothesis 1, which will then be confirmed with a model appropriateness test, and two sub-sample analyses to nuance this understanding of capital dynamics. Hypothesis 2 will be tested by considering the marginal

effects of sentiment in driving capital flow outcomes in financial market performance, GDP growth and employment growth.

### **Hypothesis 1**

Cognizant of the difficulties of estimating relationships in the presence of many unobservable confounding factors, the empirical investigation attempted to test a wide range of variables and specifications. This estimation, as well as all of the estimations that follow, test a range of lag periods to observe the time dynamics of capital responses. The estimations also include a measure of international sentiment which is here proxied with the BWSSENT variable, as well as a more country-specific measure, which is the interaction term specification of  $BWSSENT*(Financial\ Development)$ . They allow a side-by-side comparison of the degree to which financial development influences exposure to prevailing global sentiment levels and evokes a capital response from this. This paper assumes that both sources of capital flows share approximately similar fundamental determinants. Therefore, specifying dependent variables as the difference of these two sources of capital flows aims to partial out fundamental determinants of international capital flows, and negate the need for macro country-specific controls in our estimations. This assumption is tested below to affirm the appropriateness of our regression specification.

With regards to hypothesis 1: the first regression estimation below, provides evidence for a general positive relationship between sentiment and strong FPI flows, robust to global and country-specific sentiment configurations and lag periods of capital responses. Our first set of univariate regressions of the two main sentiment specifications on sentiment-driven capital flows find a robust positive relationship. The country-specific measures of investor sentiment find no evidence of superior performance of this specification in relation to the alternative global sentiment measure (BWSSENT). To appreciate the economic significance of this estimation - a 1 SD increase  $BWSSENT*(Financial\ Development)$  variable is associated with a 0.269 SD increase in the spread between FDI and FPI after 6 months ( $t=2$ ). A 1 SD increase in  $BWSSENT*(Financial\ Development)$  is associated with a 0.187 SD increase in the same spread in terms of capital inflows for the recipient country. A year ( $t=4$ ) later this relationship has increased to 0.141 SD in the spread of outflows from the country and 0.235 SD increase in the spread in inflows. The economic significance of the effects of BWSSENT are effectively identical to those in  $BWSSENT*(Financial\ Development)$ , ranging from 0.04-0.29 SD of capital



flow spread responses with a SD decrease in sentiment-level, across significant estimations. This is important to ensuring that financial development isn't explaining capital flows through a scale effect, that as financial development increases, the general increases in the economy that accompany that aren't explaining capital allocation decisions. The differenced specification of the capital flow variable ensures this is not the case. The Breusch-Pagan test for heteroscedasticity returns strong evidence for independent-variable conditional error variance for both SSI and SSO, necessitating the use of robust standard errors throughout the empirical analysis. This is a recurrent finding throughout the paper's estimations.

With regards to sentiment-driven capital inflows, Panel 2 presents a lagged, positive response of capital to sentiment. This implies that foreign investors are sluggish in response to positive sentiment movements in foreign countries, and require between 6 to 12 months to allocate capital to the destination country. This is likely to be representative of the time required to properly inform an investment decision, and establish the liquidity to actively allocate capital to that country. When considering international investment demand, the response of domestic investors to increases in sentiment in their economy, drives a more immediate reaction to increase foreign capital responses. We observe a significant response in capital outflow decisions as early as 3 months, as domestic investor responses to improving domestic investment perspectives is a greater tolerance for risk and to demand higher return opportunities abroad. It would make sense that one would inform one's capital allocation decisions primarily on the prevailing sentiment of one's domestic country, and be more sluggish in response to sentiment movements in potential foreign destination countries.

From these findings the first hypothesis is validated; there is a positive relationship between sentiment-susceptible capital and investor sentiment in terms of demand for foreign investment opportunities, and in terms of receipts from foreign investors into the destination country.

**Panel 2: Regression output of univariate estimations of sentiment on capital flows.**

Univariate fixed effects estimation of the relationship between two conceptions of investor sentiment on FPI/FDI spreads both in terms of outflows and inflows, across the period 2000-2014 to best represent the cross-section of sample countries, many of which were missing observations during the first portion of the sample. Quarterly data frequency means that the regressions at  $t=1$ , are testing the capital response effects three months after the sentiment observation.  $t$  statistics in parentheses \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ . Robust standard errors.

Time	SSI								SSO							
	BWSSENT				BWSSENT*(Financial Development)				BWSSENT				BWSSENT*( Financial Development)			
t=0	751 (0.64)				1113 (0.48)				1708.2* (2.26)				2990.7 (1.95)			
t=1	2488.3 (1.41)				4745.3 (1.39)				3575.5* (2.63)				6893.5* (2.62)			
t=2	10173.2** (2.82)				17381.5** (2.83)				11335.0** (2.86)				19856.3** (2.90)			
t=4	6804.1* (2.63)				12960.2** (2.70)				8859.2** (3.26)				17225.4*** (3.63)			
N	2274	2232	2148	1980	2148	2106	2022	1854	2274	2232	2148	1980	2148	2106	2022	1854
R-sq (within)	0.001	0.002	0.013	0.005	0.001	0.003	0.016	0.008	0.001	0.004	0.02	0.011	0.002	0.006	0.027	0.018

*Model Confirmation: Testing the assumption of equivalent fundamental determinants.*

A necessary assumption for the isolation of the sentiment-capital flow relationship is that both sources of international flows experienced the same NPV considerations driving their investment decisions. The fundamental determinants of capital allocation decisions, represented by  $P_j - \phi_j$  and observed by both types of investors - albeit with varying degrees of transparency – are not significantly difference. In order to challenge this assumption, I test for the existence of any significant fundamental difference between the two capital flows, which is represented by the final term in this expression.

$$\Delta FPI_{i,(t+1),t} - \Delta FDI_{i,(t+1)-t} = \Delta \delta_{j,(t+1)-t} + \{\Delta(P_j - \phi_j)_{j,(t+1)-t}\}$$

In order to proxy for this fundamental NPV measure, a country-specific conception of relative fundamental attractiveness is required. This paper draws on an idea from the paper of Rhodes-Kropf, Robinson & Viswanathan (2005) who used time-averaged prices to proxy fundamental value, from which they could measure short-term fluctuations around the average as irrational deviations from fundamental value. This NPV-attractiveness measure is created by using the standardized stock market price of our sample countries (2010=100) from the OECD database. Taking the difference between the average growth in stock market price per period across the whole sample of countries and the individual countries stock market growth, we are able to capture relative country-specific financial and economic performance. We use this relative market performance measure to proxy the final term in equation.

**Panel 3: Regression outputs of estimations of sentiment on capital flows, controlling for relative market performance.**

Empirical investigation into the existence of fundamental considerations driving sentiment-susceptible capital flows. Multivariate regressions of sentiment and relative market performance on SSI and SSO to confirm the appropriateness of the assumption that fundamental drivers of investment allocations have been differenced away by the specification of the dependent variables. Time-lag and sentiment specifications identical to those in Panel 2. t statistics in parentheses \* p<0.05, \*\* p<0.01, \*\*\* p<0.001. Robust standard errors.

Time	SSI								SSO							
	BWSENT				BWSENT*( Financial Development)				BWSENT				BWSENT*( Financial Development)			
t=0	751 (0.64)				1113 (0.48)				1708.2* (2.26)				2990.7 (1.95)			
t=1	2488.3 (1.41)				4745.3 (1.39)				3575.5* (2.63)				6893.5* (2.62)			
t=2	10173.2** (2.82)				17381.5** (2.83)				11335.0** (2.86)				19856.3** (2.90)			
t=4	6804.1* (2.63)				12960.2** (2.70)				8859.2** (3.26)				17225.4*** (3.63)			
Relative Stock Performance	-30.95 (-0.27)	-31.81 (-0.27)	-25.03 (-0.20)	-44.74 (-0.29)	-29.68 (-0.23)	-33.4 (-0.25)	-52.62 (-0.40)	14.32 -0.1	108.1 -1.03	124.6 -1.16	95.74 -0.9	81.99 -0.69	91.49 -0.84	87.91 -0.81	67.88 -0.63	98.27 -0.85
N	2274	2232	2148	1980	2148	2106	2022	1854	2274	2232	2148	1980	2148	2106	2022	1854
R-sq (within)	0.001	0.002	0.013	0.005	0.001	0.003	0.016	0.008	0.001	0.004	0.02	0.011	0.002	0.006	0.027	0.018

This control finds no significance in this measure across all different time-lag and sentiment-measure specifications as well as no significant increase in the explanatory power of our estimation. This indicates that the market performance of the domestic economy relative to the average market performance globally has no significant predictive power for SSI or SSO. This result is important when contrasted with the significant explanatory power that this relative performance measure has to explain variation in FDI and FPI flows independently. Relative fundamental performance of source or destination country fails to explain the variation in our dependent variable as both sources of capital flows are equally susceptible to these fundamental factors, and can therefore be differenced out of the equation. Whilst there are a range of critiques around this test- not least of which is that past performance is not necessarily an indicator of future investment prospects- this still speaks to the likelihood of SSI and SSO capturing sentiment effects. This affirms the appropriateness of the model, and the relationships represented in expressions (5) and (10).

*Testing a Survey-based Sentiment Quantification in the Model.*

To produce an understanding of the interplay of sentiment-susceptible inflows and outflows, we regress both capital flow measures on our Confidence Indicator Survey data. This variable provides organic between-country heterogeneity, unlike our main sentiment measure, reliant on an interaction term with Financial Development to develop cross-sectional variation between sample countries. This measure has been relegated to usefulness as a mere robustness check for of its relative paucity across the chosen sample. Now treating sentiment as the dependent variable, the regression estimation provides an insight into the differing time dynamics at play between inflows and outflows in response to sentiment movements.

**Panel 4: Robustness Check - Confidence Survey Interaction with Financial Development**

Random effects GLS estimation of Confidence Indicator Survey on sentiment-susceptible capital flows (SSI and SSO). Choice of estimator motivated primarily by the inclusion of endogenous cross-sectional sentiment variation from country-specific survey data. The full title of the Confidence Survey is the Business Tendency and Consumer Opinion Surveys (MEI) and was sourced from the OECD website. Regression array (1) estimated the relationship between FPI/FDI spread in terms of inflows into a destination country and Confidence Survey outcomes for that country during that period, and a 3-month, 6-month and 1-year lag period. Array (2) follows an identical specification, using SSO as a regressor. (3) combines both capital flow spread variables and relative stock market performance to test the degree to which both capital allocation decisions are able to explain variation in Confidence Indicator Sentiment. t statistics in parentheses \* p<0.05, \*\* p<0.01, \*\*\* p<0.001. Robust standard errors.

	(1)				(2)				(3)			
	t=0	t=1	t=2	t=4	t=0	t=1	t=2	t=4	t=0	t=1	t=2	t=4
SSI	0.0221* (2.26)	0.0280** (2.81)	0.0291*** (3.74)	0.0181 (1.93)					0.0221* (2.21)	0.0266* (2.45)	0.0270** (3.13)	0.0157 (1.62)
SSO					0.00371 (0.46)	0.0212* (2.19)	0.0307** (3.17)	0.0322*** (3.29)	0.00102 (0.13)	0.0179 (1.80)	0.0273** (2.75)	0.0302** (3.11)
Relative Stock Market Performance	22.15 (0.61)	26.86 (0.73)	38.39 (0.86)	50.15 (0.79)	22.37 (0.61)	28.2 (0.75)	40.6 (0.89)	52.83 (0.82)	22.09 (0.61)	28.24 (0.77)	40.73 (0.92)	53.09 (0.83)
N	1081	1068	1055	1028	1081	1068	1055	1028	1081	1068	1055	1028

This estimation can be found in Panel 4 and is useful for two reasons. Firstly it mirrors the substantive findings of our earlier empirical regression using a different sentiment proxy, which increases the evidence for a genuine positive relationship between sentiment and capital flow spreads. This robustness check is additionally useful in that it makes use of a random effects GLS estimation, which shows that the empirical findings in this paper are not incorrectly driven by choice of estimator. Its second contribution is the head-to-head perspective of our two capital flows, where the estimations contrasts with earlier time-dynamic observations. Inflows are here more agile in their response to sentiment than SSO investment decisions, whilst outflows are similarly sluggish to the estimations in Panel 2. An interpretation of the increased agility of SSI responses to sentiment changes, could be that the Confidence Indicator Survey is a better indicator of sentiment in foreign countries for investors than our sentiment interaction. These Confidence Indicators are more likely to be widely publicized across international investor information networks. They provide greater information in terms of inflows, particularly when considering that the BWSSENT index was created in 2006, and retroactively engineered into previous periods. This means that international investors have no access to this measure to incorporate it into their international investment decisions, whereas they were aware of Confidence Indexes at the time of their creation. This finding is useful in characterizing an important distinction in terms of SSO and SSI flow determinants. The third set of regressions includes both capital flow variables. It justifies the assumption that international capital inflows and outflows are effectively independent variables, with marginal attenuation of the point estimates, in either flow effect within the third set of regressions in comparison to the first two sets. Lastly, in terms of the economic significance of these two flow variables, they are quantitatively equal in their covariance with the Confidence Indicator Survey.

### *Sub-sample Analysis*

In attempting to better understand the dynamics at play in the relationship identified here, and especially when considering the highly diverse range of countries within the sample, a sub-sample analysis can best develop deeper insights into relationships between capital and sentiment flows. It is also interesting to consider sentiment dynamics during specific periods of interest across countries or time periods, as this can be informative in terms of what conditions are likely to increase investor vulnerability to irrationality from a macro-economic policy perspective.

*Subsampling across sentiment*

An interesting perspective worth briefly unpacking, is nature of the capital sentiment relationship across sub-samples of our investor sentiment measure. Intuitively the periods experiencing extreme sentiment, are of great interest as extreme volatility in foreign country investment can be highly detrimental to the recipient countries financial and real economic prospects (Hannan, 2017). These are also periods which can illuminate policy implications and provide insights into capital flight responses in periods of exuberance. This is additionally important in identifying behavioral commonalities such as the disposition effect.

The ever-present obstacle to subsampling being the diminished power of econometric inference caused by the loss of observations - is here circumnavigated through the use of broad subsample categorization. Another challenge in using subsampling to uncover generalized ideas about the dynamics of sentiment is ensuring that the subsampling does not disproportionately represent certain countries or time periods, which would limit the external validity of such outcomes.

Panel 5 highlights the increased sensitivity of capital responses to sentiment, during periods of market pessimism (>50%). We observe an SSO response similar in nature to the full sample estimation, however the response here is far greater in magnitude. This speaks to bandwagon effect often used to describe the investing behavior of household investors. That their capital allocation decisions are often conditioned on the behavior of other investors instead of solely on fundamental considerations (Scharfstein & Stein, 1990), which in this case is applied to the divestment decision. The strong positive relationship between sentiment and capital spread is likely to be self-sustaining. Holding FDI level constant, lower sentiment levels drives FPI divestment, which in turn pushes investor sentiment lower. This is an observation that can be reconciled with the insights of Guillermo Calvo (1998), who speaks of the divestment risk of foreign investment positions for the recipient economy to frustrate economic growth outcomes from foreign capital flows. With regards to SSI, we find nothing of significance in terms of responsiveness, in periods of relative market pessimism.

With regards to periods of market exuberance, here we find no reaction in terms of SSO. This finding, combined with the extraordinarily strong demand reaction to sentiment during sentiment depressions, implies that much of the power of sentiment to positively explain capital allocation decisions comes from investor skittishness during volatile market conditions.



**Panel 5: Sub-sampling sentiment hemispheres**

Fixed effects regression output using a subsample of sentiment at: BWSENT, BWSENT\*(Financial Development)<50% and BWSENT, BWSENT\*( Financial Development)>50%. Time-lag specifications and sentiment variables common to those in Panel 2. t statistics in parentheses \* p<0.05, \*\* p<0.01, \*\*\* p<0.001. Robust standard errors.

		SSO								SSI							
		BWSENT				BWSENT*( Financial Development)				BWSENT				BWSENT*( Financial Development)			
t=0	>50%	-1040.7 (-0.53)				-2860.8 (-0.73)				-1781.7 (-0.54)				-11459.2 (-1.45)			
	<50%	519 (0.52)				1223.9 (0.60)				-2198.6* (-2.56)				-3599.9** (-2.74)			
t=1	>50%	4280.8* (2.23)				8460.7* (2.26)				4313.4 (1.18)				3480.1 (0.46)			
	<50%	548.4 (0.64)				1580.2 (0.88)				-2561.5* (-2.34)				-2849.3 (-1.83)			
t=2	>50%	7524.2** (2.78)				16996.8** (3.03)				6403.4 (1.45)				10127.3 (1.49)			
	<50%	-731.5 (-0.96)				574.6 (0.32)				-2933.4* (-2.34)				-5276.5* (-2.14)			
t=4	>50%		12677.0** (2.93)				21773.8** (2.74)				9926.4** (2.84)				8655.4 (1.39)		
	<50%		-2896.5 (-1.57)				-5072.1 (-1.55)				-3308.4 (-1.74)				-8420.4* (-2.34)		
N	>50%	1103	1092	1081	1063	2242	2242	2214	2155	1103	1092	1081	1063	1220	1220	1208	1184
R2(within)	>50%	0	0.001	0.004	0.014	0	0.003	0.011	0.018	0	0.001	0.003	0.006	0.004	0	0.003	0.002
N	<50%	1146	1122	1102	1061	1202	1178	1152	1111	840	816	797	764	1202	1178	1152	1111
R2(within)	<50%	0	0	0.001	0.012	0.001	0.001	0	0.014	0.004	0.006	0.008	0.012	0.003	0.002	0.005	0.016

When considering SSI flows in high sentiment conditions, reversal of coefficient polarity is here identified as evidence for market timing behavior from international investors during periods of market exuberance. Further positive sentiment dynamics in periods of already positive sentiment could prompt a negative SSI response from investors attempting to time the market interpreting this further increase in sentiment as a warning that the market may be nearing an adjustment. Appendix Item 3 contains the estimation outputs of the effect of sentiment on capital flows for the highest and lowest quartiles of sentiment, wherein the coefficient polarity reversal is more pronounced.

*Subsampling across Country Income.*

The paper briefly considers the effects that sentiment has on capital flows within subsamples of countries according to wealth. The United Nations World Economic Situation and Prospects (WESP) Report (2012) contains a classification of High GNI countries, which provided an objective criterion by which to split the sample of countries into high and low GNI cohorts. The binary allocation according to their report can be observed in the by-country descriptive statistics in Appendix Item 1. This exposition of this investigation concerns only outflows, as SSI was tested and found to be insignificant across a range of lag periods and sentiment configurations.

From this subsampling, available in Panel 6, we observe that sentiment has almost no significant impact on high GNI countries, as all periods bar one yielded an insignificant response to sentiment. This is in contrast with the low GNI countries, who observe a robust positive SSO response to sentiment. This sub-investigation has been useful to show how our main result, which confirms Hypothesis 1, is driven almost exclusively by low GNI countries. We are attempting to measure irrational behavior in international capital allocation decisions, which is likely to find higher prevalence in countries with lower levels of financial sophistication. As evidence for this, a two sample t-test finds significantly higher levels of financial development in high GNI countries. Adding to this, making use of the self-reported Confidence Indicator survey data across 15 countries within the sample, (10 of which are high GNI countries), the data finds a significantly higher average level of confidence within the low GNI countries. Whilst this sample may be limited in its scope, it does suggest that low GNI countries have a greater SSO capital response to sentiment, because they are less financially educated and have a propensity to be more irrationally optimistic in comparison with the more pragmatic expectations of high GNI countries, which explains their increased susceptibility,

observed here. This finding is useful from a Development Economics perspective. Poorer countries have been well-documented to be susceptible to a host of problematic global influences, and are also the most vulnerable demographic in terms the inefficiency-inducing investor sentiment.

**Panel 6: Subsample Analysis across High GNI countries**

Fixed effects regression output using a subsample of sentiment at: BWSENT, BWSENT\*(Financial Development)<50% or BWSENT, BWSENT\*( Financial Development)>50%. t statistics in parentheses \* p<0.05, \*\* p<0.01, \*\*\* p<0.001. Robust standard errors.

		SSO								SSI							
		BWSENT				BWSENT*( Financial Development)				BWSENT				BWSENT*( Financial Development)			
t=0	LowGNI	903.0*				1963.4*				705.2				1121.1			
		-2.22				-2.32				-0.99				-0.69			
	HighGNI	470.9				586.9				-3330.9				-4705.7			
		-0.54				-0.43				(-1.64)				(-1.91)			
t=1	LowGNI	994.1*				2373.7*				788				1553.7			
		-2.37				-2.48				-1.14				-0.96			
	HighGNI	1258.3				2115.9				-2851.3				-3374.9			
		-1.28				-1.24				(-1.25)				(-1.30)			
t=2	LowGNI			1084.1*				2648.1*				1006.8				2115.4	
				-2.52				-2.64				-1.43				-1.27	
	HighGNI			2215.7				3946.6				-2410.1				-2441.6	
				-1.74				-1.8				(-1.13)				(-0.97)	
t=4	LowGNI			1234.3*				3061.4*				1437.4				3335.6	
				-2.58				-2.61				-1.95				-1.87	
	HighGNI			3591.5*				5526				-2037.8				-1923.1	
				-2.16				-2.02				(-0.70)				(-0.56)	
N	LowGNI	1399	1379	1359	1319	1339	1319	1299	1259	1399	1379	1359	1319	1339	1319	1299	1259
R2(within)	LowGNI	0.009	0.011	0.014	0.017	0.01	0.014	0.018	0.025	0.004	0.005	0.007	0.015	0.002	0.004	0.007	0.018
N	HighGNI	1935	1910	1885	1835	1860	1835	1810	1760	1935	1910	1885	1835	1860	1835	1810	1760
R2(within)	HighGNI	0	0.001	0.002	0.005	0	0.001	0.003	0.006	0.003	0.002	0.002	0.001	0.003	0.002	0.001	0.001

## **Hypothesis 2**

After having established a positive relationship between sentiment and sentiment-susceptible capital flows, the paper moves to consider the effects that SSI and SSO capital flows drive in markets. Due to the directionality of the capital flow data available; the paper is able to observe effects both from the perspective of the source-country, in terms of outflow effects, as well as the effects of capital inflows on markets in the destination-country. This dual-directionality is aligned with the theoretical model which predicts mispricing when there is a difference in magnitude in the biasing effects of sentiment between source-country (i) sentiment effects and destination-country (j) sentiment biasing effects, which is hereafter tested.

### *Financial Market Performance*

Equation 7 represents the potential for sentiment-driven capital flows to produce deviations from fundamental value in markets through two channels. These deviations are produced either through the biasing effects of sentiment on capital-allocation decisions from source countries, or through the propensity for destination-country suppliers of international investment to cater to the sentiment climate within the source country. In order to extend the value of this research project beyond an interesting anecdote, it will need to show that investment decisions which are informed by considerations that are not exclusively fundamental, introduce inefficiencies into the markets involved.

There are three theoretical channels through which irrationally-motivated international capital-flows can disrupt efficient financial markets. The first is the most conservative possibility. It holds that if capital flows are now to be conditioned on sentiment which varies over time, and that sentiment does not vary counter-cyclically with fundamental capital-flow decisions, and then this will introduce greater volatility in capital flows. Volatility is undesirable and will decrease the relative attractiveness and increase the risk inherent in investing in that market which will manifest in sub-optimal market outcomes as was shown in the work of Hannan (2017). The second avenue through which this may occur is through inefficient capital allocation within the destination-country. Misinformed investors are less likely to allocate their capital to the most efficient investment within the target market, which will diminish its overall marginal productivity of capital and result in adverse financial market performance. Lastly, there is a potential for a form of aggregated noise trader risk to affect the perceived risk and therefore attractiveness of the financial markets involved. De Long *et al* (1990), explain the

manner in which the unpredictability of unsophisticated investors produces a disincentive for sophisticated investors to attempt to arbitrage a mispriced asset. This theory is here aggregated to a market-wide perspective. Sophisticated investors are aware of the presence of skittish irrational investors in a foreign market, who are responsive to non-fundamental determinants in their investment decisions. Volatile sentiment movements could cause them to erratically divest for non-fundamental reasons, which would adversely affect the sophisticated investor who is exposed to that market. For this reason, sophisticated investors price an additional risk into a foreign market, which is the risk of adverse investment performance from impetuous investment behaviors motivated by irrational considerations. This could drive sophisticated investors to other less-risky markets, which would decrease the performance and efficiency of the market in question and translate into inferior performance. The source-country is also likely to experience negative financial market performance. Primarily due to the pure divestment effect on the source-country, as investment expenditure, otherwise destined to remain in the domestic economy, is now sent elsewhere. Alternatively, poor performance of foreign investment positions will have negative wealth effects on investors who reside in the source-country. Both of these will have ramifications for returns in the source country of the SSO decision.

This estimation presents evidence for the inferior market outcomes associated with sentiment-rich capital flows. Here we observe that during periods of high sentiment, capital outflows and inflows both produce suboptimal financial outcomes. To assess the economic significance of these effects with confounding scale differences between variables: a quantitative interpretation follows. Across the outflow regressions, the first two time-lag specifications find significance across both sentiment measures. An increase in the interaction of sentiment and capital spread of 1 SD is associated with a decrease in 0.0004-0.0008 SD in financial market performance. Whilst this effect translates to less than a percentile in magnitude of the dependent variable - given the economic magnitude of a country-level GDP growth outcome, this finding is economically important. With regards to capital inflows, the marginal effect is slightly larger across the estimations. GDP growth responds negatively with a magnitude of 0.0004-0.0009 SD's to an interaction variable increase of 1 SD. Interestingly the marginal effect finds significance within 3 months, which speaks to a more immediate negative response to sentiment on the recipient country in comparison with the source of irrational investment-decisions.

### Panel 7: Capital flows and Investor Sentiment on Financial Market Performance

Fixed effects estimation of the interaction between sentiment and capital flow spread on financial market performance. Financial market performance is the percentage change in stock market price-level per quarter. Sentiment variables configured as before. t statistics in parentheses \* p<0.05, \*\* p<0.01, \*\*\* p<0.001. Robust standard errors.

	SSO						SSI					
	BWSENT			BWSENT*( Financial Development)			BWSENT			BWSENT*( Financial Development)		
	t=1	t=2	t=4	t=1	t=2	t=4	t=1	t=2	t=4	t=1	t=2	t=4
Sentiment Measure	-0.377 (-1.43)	0.707* (2.56)	4.074*** (7.41)	-0.576 (-1.66)	1.088* (2.69)	6.160*** (6.97)	-0.142 (-0.49)	0.998** (3.27)	4.382*** (8.38)	-0.0746 (-0.19)	1.739*** (3.67)	6.786*** (8.01)
Sentiment-susceptible Capital Flow	0.0000481*** (4.79)	0.0000460*** (4.56)	0.0000538*** (4.98)	0.0000552*** (4.70)	0.0000526*** (4.57)	0.0000568*** (4.88)	0.0000369** (3.48)	0.0000379*** (3.80)	0.0000408*** (4.30)	0.0000381** (3.46)	0.0000381*** (3.78)	0.0000426*** (4.02)
(Sentiment Measure) * (Sentiment-susceptible Capital Flow)	-0.0000774*** (-4.10)	-0.0000750*** (-3.71)	-0.0000314 (-1.71)	-0.0000837*** (-4.34)	-0.0000848** (-3.46)	-0.0000271 (-1.33)	-0.0000499* (-2.31)	-0.0000701** (-3.15)	-0.0000479*** (-4.63)	-0.0000582* (-2.18)	-0.0000850** (-3.06)	-0.0000618*** (-4.83)
N	3108	3066	2982	2982	2940	2856	3108	3066	2982	2982	2940	2856
R-sq (within)	0.023	0.025	0.073	0.024	0.026	0.067	0.016	0.022	0.074	0.015	0.022	0.07

The independent positive effects of sentiment and capital flows on financial market performance, are interesting in light of the interaction effect. Positive capital flows, in periods of high sentiment, produce subsequent inferior performance in financial markets. This result can best be interpreted as a non-linear relationship between sentiment and capital flows on financial market outcomes. The negative effect on domestic financial markets is strongest in the 6 months following high sentiment and capital-allocation decisions. This reflects the domestic market's reaction to large divestment from the local economy. Furthermore, and more powerful in terms of the models prediction, is the negative response of destination countries to sentiment capital inflows. Here, we observe positive financial market responses to SSI independent of sentiment, which accords with intuition; as higher FPI flows, *ceteris paribus*, drives market prices higher. However, when testing the effect of SSI inflows into the destination countries financial markets at the intersection of higher sentiment, we observe a negative financial market response. This response persists for 12 months, as the ramifications of fickle investment decision-making are continued to be associated with inferior financial market performance. The contemporaneous-period interaction response was not included in the regressions, as it failed to find significance across all specifications.

### *Limits to Arbitrage*

A behavioral finance argument claiming to have identified systematic mispricing or other market inefficiency, must by necessity provide argumentation as to why these irregularities are not transformed into profitable opportunities and therefore corrected, by sophisticated market-participants. A compelling example of such an irrational mispricing within equity carve-outs, and a revealing exposition into its persistence, can be found in the paper of Lamont & Thaler (2003). In this same vein, to irrefutably situate the findings of this paper within the domain of investor irrationality, the paper must provide an obstacle to the otherwise exploitable opportunities that a market-wide mispricing as is here suggested, would produce. To prove this at an aggregated country-level, a sub-sample analysis on the Financial Efficiency variable provides evidence. The index measures a country's financial market liquidity, as share turnover scaled by GDP, as well as the efficiencies of institutions interacting within the financial markets. This makes it an acceptable proxy for a country's propensity to entertain sustained mispricing, as financially inefficient countries are likely to have hard-to-value assets in combination with limits to establishing arbitrage positions to exploit this.



As the Financial Efficiency index forms a sub-component of the Financial Development index, a portion of the country-specific sentiment variable, they are significantly correlated (corr. = 0.6342). This would preclude an investigation into the ability of Financial Efficiency to explain the intersection between sentiment and capital spreads, in an empirical estimation. To circumnavigate this potential simultaneity, the estimation in Panel 7 was split in terms of efficient and inefficient financial markets at the median of Financial Efficiency. Of importance in this estimation, is magnitude of the marginal sentiment-capital effect on stock market performance. We can see here that countries with inefficient financial markets are more responsive to sentiment-rich capital flows, than the subsample of efficient financial markets. The final row of Panel 8 quantifies the relative magnitude of the interaction effects. It is here that we are able to properly appreciate the degree to which less-developed financial markets are less successful in correcting for price deviations. Highly efficient markets enjoy a generally more positive and significant relationship between sentiment and financial market performance and between capital flow spreads and financial market performance than inefficient financial markets. This is disproportionate to the degree to which the respective sub-samples are susceptible to sentiment independently. This makes the finding that at the margin inefficient markets are affected by these dynamics to a greater degree than efficient markets even more pronounced. This observation is powerful in that the paper had concluded earlier that financial development increased the sensitivity of a country's capital allocation decisions to sentiment, yet here we observe that lower financial efficiency produces a greater marginal effect in stock market performance.

**Panel 8: Capital flows and Investor Sentiment on Financial Market Performance across different limits to arbitrage**

Fixed effects regression subsampling on Financial Efficiency to proxy for limits to arbitrage. Low Limits to Arbitrage/Financial Efficiency is identified as the top 50% of the IMF Financial Efficiency Index (Svirydzenka, 2016), whilst Financial Inefficiency proxying substantial limits to arbitrage estimates the interaction relationship amongst the observations in the bottom half score for Financial Efficiency. Financial Efficiency measures efficiency within financial institutions in terms of their lending-deposit spread, operational efficiency and profitability, as well as within financial markets which is captured in the stock market turnover ratio, the volume of stocks traded to GDP. These two components provide an acceptable proxy for the limits to arbitrage experienced by a sophisticated investor to correct a mispricing. t statistics in parentheses \* p<0.05, \*\* p<0.01, \*\*\* p<0.001. Robust standard errors.

<b>Capital flows and Investor Sentiment on Financial Market Performance with Low Limits to Arbitrage/Financial Efficiency</b>												
	SSO						SSI					
	BWSENT		t=4	BWSENT*( Financial Development)			BWSENT			BWSENT*( Financial Development)		
	t=1	t=2		t=1	t=2	t=4	t=1	t=2	t=4	t=1	t=2	t=4
Sentiment Measure	-0.236 (-0.71)	0.909* -2.31	4.332*** -6.05	-0.51 (-1.22)	1.036 -2.01	5.629*** -5.93	0.0785 -0.22	1.313** -3.17	4.663*** -6.68	0.0268 -0.06	1.743** -3.08	6.214*** -6.86
Sentiment-susceptible Capital Flow	0.0000445*** -3.82	0.0000463*** -3.78	0.0000500*** -4.24	0.0000507*** -3.78	0.0000490*** -3.7	0.0000520*** -4.26	0.0000322* -2.69	0.0000338** -2.81	0.0000354** -3.01	0.0000330* -2.66	0.0000337** -2.8	0.0000369** -3.09
(Sentiment Measure) * (Sentiment-susceptible Capital)	<b>-0.0000625*** (-4.42)</b>	<b>-0.0000603*** (-4.14)</b>	<b>-0.0000198 (-1.55)</b>	<b>-0.0000688*** (-4.70)</b>	<b>-0.0000683*** (-3.96)</b>	<b>-0.0000174 (-1.27)</b>	<b>-0.0000439* (-2.21)</b>	<b>-0.0000630** (-3.15)</b>	<b>-0.0000414*** (-5.29)</b>	<b>-0.0000485* (-2.04)</b>	<b>-0.0000722** (-2.93)</b>	<b>-0.0000512*** (-5.54)</b>
N	1924	1882	1816	1816	1792	1744	1924	1882	1816	1816	1792	1744
R-sq (within)	0.022	0.028	0.079	0.025	0.027	0.07	0.015	0.024	0.081	0.015	0.022	0.072
<b>Capital flows and Investor Sentiment on Financial Market Performance with High Limits to Arbitrage/Financial Inefficiency</b>												
	SSO						SSI					
	BWSENT		t=4	BWSENT*( Financial Development)			BWSENT			BWSENT*( Financial Development)		
	t=1	t=2		t=1	t=2	t=4	t=1	t=2	t=4	t=1	t=2	t=4
Sentiment Measure	-0.817 (-1.28)	0.226 -0.35	3.964*** -4.63	-1.087 (-0.90)	1.179 -0.93	8.489*** -4.39	-0.000148 (-1.47)	-0.000179 (-2.04)	-0.000170* (-2.38)	-0.000265* (-2.09)	-0.000305** (-3.08)	8.410*** -4.21
Sentiment-susceptible Capital Flow	0.0000490* -2.21	0.0000328 -1.37	0.0000166 -1.29	0.0000505* -2.19	0.0000347 -1.41	0.0000189 -1.5	0.0000388 -1.4	0.0000305 -1.11	0.000029 -1.28	0.0000281 -1.1	0.0000195 -0.77	0.0000251 -1.25
(Sentiment Measure) * (Sentiment-susceptible Capital)	<b>-0.000178** (-3.13)</b>	<b>-0.000218*** (-4.16)</b>	<b>-0.000267*** (-7.39)</b>	<b>-0.000231** (-2.90)</b>	<b>-0.000282*** (-3.95)</b>	<b>-0.000347*** (-7.42)</b>	<b>-0.000148 (-1.47)</b>	<b>-0.000179 (-2.04)</b>	<b>-0.000170* (-2.38)</b>	<b>-0.000265* (-2.09)</b>	<b>-0.000305** (-3.08)</b>	<b>-0.000273*** (-4.09)</b>
N	1184	1184	1166	1166	1148	1112	1184	1184	1166	1166	1148	1112
R-sq (within)	0.029	0.031	0.075	0.027	0.032	0.076	0.021	0.022	0.062	0.022	0.027	0.068
Magnitude of marginal effects: (Inefficient Markets/Efficient Markets)	2.8x Both significant	3.6x Both significant	13.5x Low efficiency significant	3.5x Both significant	4.1x Both significant	19.9x Low efficiency significant	3.4x High efficiency significant	2.8x High efficiency significant	4.1x Both significant	5.5x Both significant	4.2x Both significant	5.3x Both significant

In response to the objective of this section, which was to demonstrate limits to arbitrage which prevent sophisticated market participants creating profitable arbitrage opportunities and thereby correcting the mispricing: there are a few explanations. The first draws on the findings of the subsample analysis explained above. Inefficient capital markets reduce the ability of sophisticated investors to appreciate fundamental value. Simply, they increase the costs involved in obtaining and sustaining short-positions in the event of over-pricing. Inefficient financial markets may be subject to undue political or other anecdotal risk that would also serve as a disincentive to arbitrageurs. Another possibility relates to the economic significance of the marginal effects in Panel 7 and 8. As the mispricing itself is likely to be a proportionately small effect on a country's aggregated returns, the profitability of arbitraging it may simply just not be worth the trouble. In sum, there are multiple possible explanations for the persistence of mispricing in this context, which justifies the conclusion that investor irrationality and not an unobservable fundamental characteristic is more likely to be the appropriate explanation for this.

#### *Real Economic Outcomes*

With robust evidence for the positive relationship between sentiment-rich capital flows and sentiment and that the intersection of sentiment and international capital flows is associated with mispricing and exacerbated by limits to arbitrage: the paper now tests for real economic outcomes that are produced by these capital flows. Mclean and Zhao (2014) find evidence for sentiment effects on real economic outcomes, particularly employment effects at the margin. This paper builds on that intuition in considering the effects of sentiment interacted with SSI and SSO on real outcomes, the outcomes of interest to this section are GDP growth and Employment Growth.

This estimation reveals a small yet significant marginal effects that capital transfers in periods of high sentiment have on economic growth both in terms of the source and destination countries. Quantitatively; a 1 SD increase in the marginal effect of BW\*(Financial Development) and SSO, corresponds to a 0.0765 SD decrease in GDP growth after a one quarter lag (t=1). After 6 months (t=2), this marginal effect is associated with a 0.0619 SD decrease, and is insignificant after a year. When considering inflows on the destination country's economic performance, a 1 SD increase in the marginal effect of BW\*(Financial Development) and SSI after a three month lag (t=1) corresponds to a -0.0655 SD change in

**Panel 9: Marginal effect of capital flows and sentiment on GDP Growth**

Fixed effects estimation of the intersection of investor sentiment and capital flow spreads on GDP Growth. GDP growth calculated as the percentage change in growth of GDP from quarter-to-quarter. t statistics in parentheses \* p<0.05, \*\* p<0.01, \*\*\* p<0.001. Robust standard errors.

	SSO						SSI					
	BWSSENT			BWSSENT*( Financial Development)			BWSSENT			BWSSENT*( Financial Development)		
	t=1	t=2	t=4	t=1	t=2	t=4	t=1	t=2	t=4	t=1	t=2	t=4
Sentiment	0.392*** -6.13	0.458*** -8.13	0.529*** -8.87	0.597*** -6.81	0.688*** -7.97	0.802*** -8.15	0.416*** -6.09	0.481*** -7.88	0.547*** -8.96	0.650*** -6.82	0.733*** -7.81	0.836*** -8.42
Sentiment Susceptible Capital Flow	0.000000912 -0.61	0.000000818 -0.56	0.00000187 -1.18	0.00000142 -0.9	0.00000125 -0.82	0.00000208 -1.39	0.00000223 -1.15	0.00000243 -1.23	0.00000187 -1.19	0.00000143 -0.94	0.00000156 -0.98	0.00000204 -1.24
(Sentiment Measure) * (Sentiment- susceptible Capital Flow)	-0.0000110*** (-4.31)	-0.00000906*** (-4.19)	-0.00000407* (-2.39)	-0.0000124*** (-3.83)	-0.0000101*** (-3.98)	-0.00000371 (-1.84)	-0.00000625** (-2.77)	-0.00000603* (-2.50)	-0.00000132 (-1.13)	-0.00000858** (-3.02)	-0.00000696* (-2.39)	-0.00000168 (-1.04)
N	3100	3057	2971	2971	2928	2842	3100	3057	2971	2971	2928	2842
R-sq	0.031	0.04	0.052	0.031	0.039	0.048	0.03	0.039	0.051	0.029	0.037	0.047

GDP growth. This decreases to -0.0533 at  $t=2$  where it then fails to find significance at  $t=4$ . This estimation has shown the potential for misinformed capital-allocation decisions to detriment economic growth outcomes in both the source and destination countries. The lack of control for other determinants of GDP growth, and the large, positive relationship between sentiment and GDP growth; implies that there are other drivers of GDP growth which are captured in the estimation here, which detracts from the usefulness of a literal quantitative estimation of this. However, at a more nuanced level, the nature of the marginal relationship is interesting and useful. We observe that independently, sentiment positively effects economic outcomes, yet our interaction term reveals that when higher sentiment levels translate into international capital transfers, and this is associated with lower economic performance. This non-linear relationship of sentiment and capital spreads, is similar to that observed in financial market data. This implies that sentiment can independently produce positive effects for economic growth within a country, particularly in the short run ( $<1$ year). If, however, these sentiment upswings drive international capital transfers at extreme levels of sentiment - then the misallocations and inefficiencies associated with this, impair GDP growth

Employment outcomes are an important metric when considering the holistic effects of macro-economic adjustments in a country, due to the welfare implications of employment levels. As observed with GDP Growth, the independent effect of sentiment on the domestic-country employment-growth is shown in Panel 10 to be positive, as higher levels of sentiment stimulate investment and the growth in employment that follows. As both sentiment specifications are predominantly global measures, a strong positive relationship with sentiment and employment is to be expected. Of interest to this investigation, is the intersection of this sentiment measure with capital flows, and the effect this has on employment growth. The marginal effect of sentiment and capital flows on employment growth, is effectively economically-insignificant in both source and destination country. A 1 SD increase in the interaction term is associated with a decrease of less than 0.001 SD of the employment outcome, across all of the significant coefficients. As GDP growth finds a significant relationship with this marginal effect, one would expect this to translate into employment outcomes. This result could be explained by regression attenuation. That the coarseness of a largely global sentiment specification fails to explain country-specific employment decisions across a diverse cross-section of countries. In the alternative, it is also worth noting that the capital flow variables are the difference of two sources of capital flows which also speaks to their impotence in translating sentiment effects into employment outcomes.

### Panel 10: Capital flows and Investor Sentiment on Employment

Fixed effects estimation of the intersection of investor sentiment and capital flow spreads on Employment Growth. Employment Growth calculated as the percentage change in growth of total employment data from quarter-to-quarter (sourced from the OECD website). t statistics in parentheses \* p<0.05, \*\* p<0.01, \*\*\* p<0.001. Robust standard errors.

	SSO						SSI					
	BWSENT			BWSENT*( Financial Development)			BWSENT			BWSENT*( Financial Development)		
	t=1	t=2	t=4	t=1	t=2	t=4	t=1	t=2	t=4	t=1	t=2	t=4
Sentiment	0.153***	0.130***	0.224***	0.241***	0.221***	0.335***	0.156***	0.133***	0.220***	0.246***	0.224***	0.324***
	-4.08	-3.99	-5.04	-4.47	-4.44	-5.17	-3.98	-3.91	-4.85	-4.28	-4.26	-4.88
Sentiment Susceptible Capital Flow	0.000000912	-0.000000361	0.000000209	-0.00000147	-0.000000394	0.000000384	-6.34E-08	0.000000328	0.00000217*	-0.0000004	0.000000344	0.000000927
	-0.61	(-0.28)	-0.16	(-0.74)	(-0.27)	-0.31	(-0.05)	-0.39	-2.45	(-0.27)	-0.3	-1.21
(Sentiment Measure) * (Sentiment- susceptible Capital Flow)	-0.000000904	-0.00000906***	-0.00000407*	-0.0000124***	-0.0000101***	-0.00000371	-0.00000625**	-0.00000603*	-0.00000132	-0.00000858**	-0.00000696*	0.00000251
	(-0.51)	(-4.19)	(-2.39)	(-3.83)	(-3.98)	(-1.84)	(-2.77)	(-2.50)	(-1.13)	(-3.02)	(-2.39)	-1.8
N	2261	2224	2149	2149	2111	2035	2261	2224	2149	2149	2111	2035
R-sq (within)	0.01	0.007	0.018	0.01	0.008	0.017	0.009	0.007	0.019	0.01	0.009	0.019

Concluding hypothesis 2, it is important to characterize the channel through which sentiment produces inferior financial and real outcomes. Sentiment itself does not detriment market outcomes directly, instead it evokes misinformed capital responses which translate into sub-optimal outcomes. These impetuous capital transfers increase volatility in both source and recipient country and the risk of sudden divestment in the event of a sentiment downturn introduces a form of aggregated noise trader risk. This increases the risk of investing in the market, as well as decreases the marginal productivity of capital due to the capital misallocation characterized by non-fundamental investment decisions which detracts economic performance. Therefore, our empirical investigation with regards to Hypothesis 2 suggests that SSI and SSO are indeed associated with inferior real market outcomes, however only through an interaction with high sentiment levels, and limited in magnitude. Financial markets become enablers for irrational financial decision-making to effect other real outcomes, which is a finding that enjoys broad support throughout behavioral finance.

#### *Alternative Explanation*

There exists an alternative explanation for the observations above, which claims that periods of global market volatility driven by fundamental considerations, cause investors to favor investing in the inherently more agile FPI. This period of volatility would increase the spread between the two capital flows and therefore the dependent variable, and would naturally be associated with inferior economic performance across the three performance indicator variables, however not through the sentiment channel that this paper presents. Evidence against this potential explanation, is in the positive relationship between sentiment-rich capital flows and financial market performance independently, as observed in Panel 7. This means that these capital flows are increasing in periods of economic upswing as individual investors demand greater returns in financially fruitful periods. This is contrasted with the negative marginal effect of sentiment on capital flows in producing sub-optimal market performance. We find no evidence for a negative relationship between our capital-flow interest variables and either of our other real economic variables in Panels 8 and 9 either, which further favors the chosen explanation, and resulting confirmation of Hypothesis 2.

## **6. Discussion**

The discussion of this paper will provide an introspective exposition into the major issues dealt with in the paper, and an honest appraisal of the successes and shortcomings achieved in them.

### *Model Critique*

The model is a preliminary attempt at understanding the degree to which non-fundamental factors motivate international transfers of capital. In order to develop feasibly testable relationships, a number of simplifying assumptions were conceded. Despite this, the model provides a plausible avenue through which capital allocation decisions might be influenced by sentiment. Further work in this area may opt for a smaller, more detailed and directional capital flow sample, which would allow matching source and destination countries to better estimate determinants of these decisions. The model accommodated for this study's inability to control for a range of country-level and global drivers of capital. Ideally, controlling for time-variation in these fundamental characteristics, the estimations made in the model would be more useful quantitatively than the present case.

What is important to mention here, is that the model and subsequent estimations were not looking to produce specific economically-applicable measurements. The capital-spread variable itself - as the difference between two sources of capital flows into, or out of, a country - is of little policy value in itself. Instead this model has produced a coherent channel through which sentiment may affect capital allocation decisions, and developed a means to test this. In a real-world context, there is little merit in assuming that FDI capital-allocation decisions are absolutely immune to the effects of sentiment, yet there is something valuable to conclude that portfolio investments are to a greater degree susceptible to the influence of sentiment than FDI. To show that the outcomes for source and destination countries involved in capital flows which are largely associated with prevailing sentiment dynamics, are inferior; is an interesting observation. Finally, and most importantly, this model has provided the structure and intuition to find evidence for the involvement of irrational considerations within capital-allocation decisions across a range of outcomes. With further evidence to suggest that these effects are exacerbated by inefficient market conditions where uncertainty of fundamental value and limits to arbitrage are likely to sustain price deviations and amplify their effects.

### *Econometric Issues*

The primary econometric challenge of this paper was the relatively low explanatory power of the estimation models in our paper, as evidenced by low  $R^2$ (within) values reported throughout the regression estimations. This issue is best addressed by restating the overarching objective of this empirical investigation, which was not to attempt to derive a function explaining all of



the variance of the dependent variables. Instead, the empirical work looked to establish broad generalizations regards the univariate effects of the sentiment-capital relationship over time. A fixed-effects model was chosen to negate the need to control for country-specific dynamics, which given the breadth of the sample would restrict the breadth of the sample and introduce noise. The fixed effects estimations across the paper returned extremely large intra-class correlations ( $\rho$ ), which ranged between 30-75% depending on the regression, explained by the cross-sectional invariance in sentiment level. This fixed-effects estimator, whilst powerful in terms of establishing strong and directional relationships, by definition ignores all between-country variation which is here shown to be significant. This is suitable, given the lack of endogenous cross-sectional variation in the sentiment variable which was created through an interaction with a coarse proxy for Financial Development, and therefore provides no endogenous between-country sentiment heterogeneity. In this sample, cross-sectional estimation would effectively test the influence of financial development on capital allocation decision, which while interesting, is unrelated to this research objective. In each period, the sentiment experienced by each country only differed in the degree of development of their financial markets. Our longitudinal estimation therefore captures changes in sentiment and financial development over time, and the degree to which this is associated with the capital flow spread variables. This choice of estimator is increasingly suitable for econometric contexts such as this, which tackle a range of country-specific unobservable determinants of financial outcomes, which are increasingly tricky to proxy.

Given the constraints within which this paper was required to produce convincing evidence for such an econometrically elusive effect – the elected “shotgun approach” has succeeded in presenting a complete picture of the functioning of sentiment within this interest area. In order to produce insights with the specificity to inform prescriptive policy, research in this area needs to isolate areas within the conceptual framework, and test them individually. This papers foremost goal was to present the theoretical framework and behavioral expectations, which left it with much to test. Smaller, more focused and controlled for estimations, would provide deeper evidence for the dynamics this paper has theorized.

### *External Applications*

Assuming that the paper has produced evidence for the relationships suggested above, what are the implications for this going forwards? The overarching insight of this paper is, at a very

general level, a prescriptively interesting international economic policy perspective. Whilst liberalizing international capital flows and empowering individuals to broaden the scope of their investment exposures by pursuing offshore exposure has undoubted diversificational benefits; there is a qualification to this. Giving susceptible investors greater reach in terms of their investments, has the potential to detriment both source and destination countries if the capital-allocation decision lacks fundamental motivations. As technology is able to facilitate increasingly agile investment opportunities in foreign markets, this has the potential to exacerbate the fragility of certain economies who find themselves reliant on foreign capital flows. Foreign investment flows as per the literature above, exhibits bandwagon effect behaviors in both investment and divestment decisions. This, in combination with a lesser appreciation of fundamental value, due to the increased cognitive distance of dealing with an unfamiliar foreign market, has the potential to introduce potentially devastating noise-trader risk to countries with a reliance on a foreign capital-flow status quo. A common behavioral asset-mispricing research paper, concludes on the undesirable outcomes produced by whichever naïve investment decision and corresponding mispricing, the paper has identified. This paper, in a sense, is also able to include international capital-allocation decisions as another context within which irrational investing behavior produces sub-optimal outcomes. Efficiency, accessibility and liquidity of international transfers is a prioritized area of global financial development, yet this should be matched with prudential measures to reinforce the systemic robustness of increasingly interrelated global markets, to the downside risk of divestment shocks.

## **7. Conclusion**

This study has pursued a range of different approaches in an attempt to better characterize the nature of irrationality within international capital allocation decisions makes a valuable contribution to the international behavioral finance literature in three main areas.

Firstly, the paper creates a model which describes the interaction between two significant capital flows and the nature of their relationship with investor sentiment in a cross-country context, by describing the capital allocation decision from the perspective of an investor demanding foreign investment opportunities, and from the agents supplying them. The model reconciles behavioral finance theory of asymmetric information and investor-overconfidence with an aggregated macro-economic perspective, to conceive a potential avenue through which to understand the role sentiment plays in international capital flows. This is useful for extending

behavioral insights beyond a single market or context, within which they are often constrained. The model introduces the potential for market imperfections or mispricing to be understood, from either a demand or supply perspective. This lays the groundwork for more focused empirical work, to better estimate the relative strength of the two potential sources of market inefficiencies. By outlining an understanding of the dynamics at work in the supply and demand functions, the model provides for an equilibrium pricing function, to explain how the influence of irrational dynamics produce sub-optimal equilibrium outcomes. This equilibrium function represents the distorting influence of non-fundamental behaviors on the price level, in terms of either demand-side or supply-side sentiment-conditioned influences.

Secondly, the paper contributes empirical evidence through robust empirical estimations. Through the milieu of confounding and unobservable determinants of international capital flows, the paper discovers that the spread of FPI and FDI has a robust positive relationship with sentiment in terms of both general global and country-specific sentiment levels. This is made possible by the differenced specification of the SSO and SSI variables, which provide for a clean regression estimation without the need for a vector of country-specific controls. The theoretical expectation that portfolio investment decisions are more responsive to sentiment levels, is clearly demonstrated in the data. This effect is driven by poor countries and is stronger in periods of investor pessimism. Having isolated a component of international capital flows rich in sentiment, the paper measures the degree to which sentiment-rich capital flows are associated with real economic outcomes. The findings regarding Hypothesis 2 affirm and contribute to the existing body of behavioral corporate finance literature, as it is reconcilable the established understanding of sentiment as having a marginal effect on real outcomes. The data finds a negative economic response to sentiment-driven capital allocation decisions at the margin of sentiment. This produces an intuitively appealing explanation of the manner in which sentiment is able to affect real economic variables. Capital flow spreads are not, *ceteris paribus*, associated with lower economic or financial performance for source or recipient countries; only when such allocation decisions are conditioned on extreme sentiment measures does this capital allocation result in inferior market performance and economic outcomes.

Lastly, the paper has produced an insight into what is additionally required to develop a fuller picture regarding sentiment dynamics on a global scale. It has attempted a broad, descriptive foray into behavioral finance on an international scale, an area expected to receive intensified attention in future, as a single, globalized financial market develops. The paper's primary

objective has been to develop a framework within which one might begin to formalize the influence of sentiment in a global context. The paper has pursued some of the empirical estimations resulting from this model, with the data that was available; ultimately, however, it serves to inform future research in this area. It has highlighted the need for comprehensive, quantitative and country-specific investor sentiment measures, and capital flow data that matches source with destination country. With these data available, an investigation into a deeper, and potentially causal, relationship between sentiment-rich capital flows and economic outcomes, could be feasible. As with the interrelated nature of economic and financial forces in other sub-disciplines of behavioral finance, non-fundamental perceptions of the attractiveness of investment opportunities colors an increasingly broad scope of contexts.

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<http://documents.worldbank.org/curated/en/917631468138290229/Analysis-and-summary-tables>

## Appendix

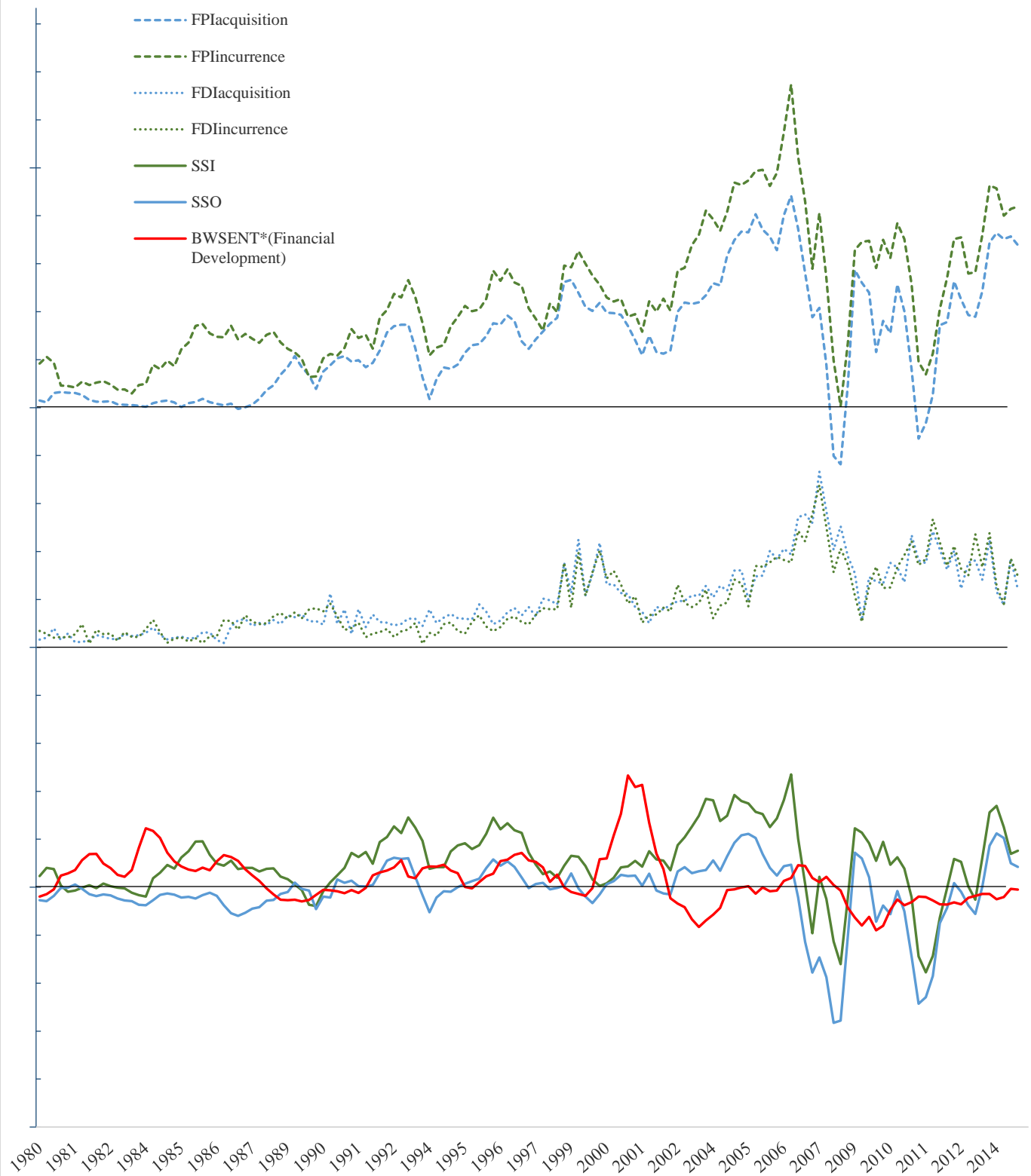
### Appendix Item 1: Descriptive statistics of international capital flow data, by country

Table to show the distribution of capital flow data by country. Heterogeneity in the distribution of data over countries, evidence of moderate overrepresentation of sophisticated economies in terms of capital flow data availability, however not to the detriment of the generality of this study. Two correlation variables are calculated as the correlation between country capital flows and country-specific sentiment measure to demonstrate the non-uniform nature of capital allocation decision and sentiment across the sample. Column 1 represents the capital flow data availability, which for SSI and SSO was identical per country. GNI categorization from The United Nations World Economic Situation and Prospects (WESP) Report (2012)

Country	N. Obs(SS1/SSO)	Mean(SS1)	Mean(SSO)	corr{BWSSENT*(Financial Development , SS1)}	corr{BWSSENT*(Financial Development , SSO)}	High GNI Country
Australia	115	4869.48	4002.93	-0.2059	-0.1949	Y
Austria	72	941.69	-812.95	0.0837	0.0788	N
Belgium	56	-9466.84	-8211.45	0.1361	0.1167	Y
Brazil	89	-6647.55	-2214.89	0.0954	0.19	N
Canada	145	2471.97	-3265.91	-0.1908	0.183	Y
Chile	57	-2603.62	-159.24	-0.0698	0.0384	N
China (People's Republic of)	76	-30204.27	-7400.71	0.3284	0.2727	N
Colombia	68	-1059.15	-206.87	0.1705	0.1394	N
Costa Rica	68	-381.18	-52.50	0.1505	0.0961	N
Czech Republic	96	-837.68	-202.88	0.0005	0.1816	N
Denmark	49	3633.83	1709.57	-0.0961	-0.2515	N
Estonia	97	-252.21	-27.71	0.2087	0.0768	Y
Finland	72	1691.71	2160.60	-0.1502	-0.1972	Y
France	72	23346.39	5878.70	-0.1715	-0.0183	Y
Germany	104	9163.02	8573.75	0.0927	0.0592	Y
Greece	60	927.76	2298.79	0.1559	-0.004	Y
Hungary	72	-2221.76	-1804.82	-0.0287	-0.0257	Y
Iceland	89	254.06	-36.95	-0.095	-0.0225	Y
India	27	41290.08	43729.08	0.1294	0.2636	N
Indonesia	53	-540.23	-1079.28	0.0477	-0.0037	N
Ireland	60	19480.88	15110.04	0.3174	0.2467	Y
Israel	89	-808.75	-78.52	0.03	-0.1207	N
Italy	80	8418.01	6092.61	0.0106	0.0621	Y
Japan	84	23187.76	15722.35	-0.0783	-0.041	Y
Korea	149	1069.07	29.38	-0.1288	0.1557	N
Latvia	69	-108.85	112.15	-0.0905	-0.0204	N
Lithuania	53	-71.25	89.36	-0.5718	-0.0669	N
Luxembourg	61	4827.54	-21931.20	0.1352	-0.0164	Y
Mexico	45	642.35	-1027.11	-0.2675	-0.0493	N
Netherlands	55	-47271.95	-56032.38	-0.3167	-0.3469	Y
New Zealand	68	755.27	669.09	-0.0476	0.0196	Y
Norway	49	2751.82	9335.66	0.219	0.2351	Y
Poland	52	-1479.90	-794.89	-0.4576	-0.0074	Y
Portugal	84	-401.04	207.62	0.0772	-0.0373	Y
Russia	80	-6301.30	-6108.18	0.2537	0.2545	N
Saudi Arabia	44	-4233.06	2542.85	0.179	-0.0558	Y
Slovak Republic	52	-85.82	66.64	-0.196	-0.0737	N
Slovenia	88	127.28	84.67	-0.1614	0.0742	N
South Africa	128	948.45	121.72	-0.2476	0.0902	N
Spain	72	4037.85	-6630.79	0.0434	0.0753	Y
Sweden	141	388.05	-944.48	-0.1272	0.0582	Y
Switzerland	68	-4886.06	-4845.79	0.057	0.1299	Y
Turkey	100	-197.14	-119.29	-0.1294	0.148	N
United Kingdom	120	12548.64	-3307.78	-0.1033	-0.0346	Y
United States	149	46996.47	-11160.42	-0.1718	0.0845	Y



### Appendix Item 2: Capital Flows and Sentiment from (1980-2014)



x-axis scale: 1 tick = 6 million USD. Horizontal gridlines represent zero for the respective graph. y-axis timespan of sample, observations at a quarterly frequency. Capital Account data from the OECD website.  $SSI = FPI_{incurrence} - FDI_{incurrence}$ ,  $SSO = FPI_{acquisition} - FDI_{acquisition}$ .  $BWSSENT^*(Financial\ Development)$ , interaction between the monthly BW sentiment index aggregated to a quarterly frequency, and Financial Development Index available on the World Bank website.

**Appendix Item 3: Subsampling On Extreme Sentiment: Capital Responses**

Fixed effect regression estimation using only observations with BWSSENT, BWSSENT\*( Financial Development)<25% or BWSSENT, BWSSENT\*( Financial Development)>75%. The disproportionately small number of observations for Sentiment>75% is due to the fact that high sentiment measures early in the time-sample were not matched with capital flows. t statistics in parentheses \* p<0.05, \*\* p<0.01, \*\*\* p<0.001. Robust standard errors.

		SSO								SSI							
		BWSSENT				BWSSENT*( Financial Development)				BWSSENT				BWSSENT*( Financial Development)			
t=0	>25%	-13707.9***				-3056.5				-16558.9**				-20386.6*			
		(-3.69)				(-0.78)				(-2.69)				(-2.64)			
t=0	<75%	-176.7				-875.5				-844.6*				-2035.4			
		(-0.42)				(-0.75)				(-2.11)				(-1.10)			
t=1	>25%		-14042.5*				6071.9				-14246.4*				-14417.8		
			(-2.60)				(1.51)				(-2.16)				(-1.51)		
t=1	<75%		-91.05				-294.7				-1731.7				-3088.0*		
			(-0.11)				(-0.22)				(-1.28)				(-2.13)		
t=2	>25%		-5267.3				13878.3*				-5742.9				-5260.9		
			(-1.40)				-2.67				(-0.91)				(-0.62)		
t=2	<75%		388.2				-900.2				-1739.0**				-4159.0**		
			(0.48)				(-0.63)				(-2.88)				(-2.95)		
t=4	>25%				9216.8				22043.9**				2673.4				515.2
					(1.34)				(2.92)				(0.77)				(0.07)
t=4	<75%				-1994.3				-5169.3				-2785.8				-6042.5
					(-1.17)				(-1.28)				(-1.23)				(-1.49)
>25%	N	1103	1092	1081	1063	2242	2242	2214	2155	1103	1092	1081	1063	1220	1220	1208	1184
<75%	N	439	428	418	396	627	582	574	554	439	428	418	396	627	582	574	554

This estimation proves interesting for a number of reasons: primarily, for the reverse polarity in the relationship between sentiment and capital flows during periods of sentiment extremes, and secondly, for the magnitude of capital allocation sensitivity during periods of sentiment extremes. With regards to SSO, we see a strong contemporaneous negative response of the capital spread with regards to sentiment. This paper suggests an explanation for this non-intuitive capital response as market timing behavior from investors who are susceptible to sentiment. When sentiment is at its extremes, sophisticated investors treat sentiment movements as a form of “stupid-money” indicator. Another potential explanation for this is that FDI is sluggish in adjusting investment flows during periods of severe pessimism. By nature, FDI flows often require a significant pre-commitment on the part of investors, which they are then unable to renege on in the event of deteriorating conditions. If there is a sudden sentiment downswing, portfolio investment are better able to adapt to them and curtail their investment decision. This finding is important to show the persistence of FDI flows in relation to more mobile portfolio investments. Also, as can be observed in Appendix Item 2, we find many of the peaks in sentiment during the period 1981-1987, during which period we have a very low representation in capital flow observations - this explains why the top quartile enjoys less than half of the observations of the lowest quartile.

**Appendix Item 4:** Theoretically complete model of the influence of sentiment levels of capital allocation decisions.

This adaption of the model, is reliant on the same assumptions as earlier.

*Country i - Outflows; Demand for international investment from source-country i into country j*

$$FPI_{i(out),t} = k_{i,t}((\Phi_{j,t} + (\delta_{i(j),t} - \delta_{i(i),t})) - P_{j,t}) \quad (18)$$

$$FDI_{i(out),t} = K_{i,t}(\Phi_{j,t} - P_{j,t}) \quad (19)$$

$$Q_{D:t} = k_{i,t}((\Phi_{j,t} + (\delta_{i(j),t} - \delta_{i(i),t})) - P_{j,t}) + K_{i,t}(\Phi_{j,t} - P_{j,t}) \quad (20)$$

Portfolio investment decisions are a function of fundamental considerations in combination with source-country investors understanding of the relative magnitudes of sentiment in the destination-country as well as sentiment within their own country.

$$\left( \frac{\partial t}{\partial (K_{i,t} = k_{i,t})} \right) [FPI_{i(out),t} - FDI_{i(out),t}] = \Delta(k_{i,(t+1),t} \delta_{i(j),(t+1),t}) - \Delta(k_{i,(t+1),t} \delta_{i(i),(t+1),t})$$

Or

$$\Delta FPI_{j(out);(t+1),t} - \Delta FDI_{j(out);(t+1)-t} = \Delta \delta_{i(j),(t+1),t} - \Delta \delta_{i(i),(t+1),t} \quad (21)$$

*Country j: Inflows - Supply of international investment opportunities*

Here, an extension of the intuition of the demand-side formation.

$$FPI_{j(in),t} = k_i((P_{j,t} + (\delta_{j(j),t} - \delta_{j(i),t})) - \phi_{j,t}) \quad (22)$$

$$FDI_{j(in),t} = K_i((P_{j,t} - \phi_{j,t})) \quad (23)$$

Here it can be seen that the supply of portfolio investment opportunities is a function of country j's understanding of sentiment levels in their own country relative to their impression of sentiment levels in the source-country i.

$$Q_{s:t} = b \cdot k_{i,t}((P_{j,t} + (\delta_{j(j),t} - \delta_{j(i),t})) - \phi_{j,t}) + b \cdot K_{i,t}(P_{j,t} - \phi_{j,t}) \quad (24)$$

An empirical investigation into the sentiment effects within portfolio investment to a country supplying international investment opportunities under this model would require tracking capital flows between source and destination countries. Furthermore, it would require explicit country-specific sentiment measures for both source and destination countries.

$$\left( \frac{\partial t}{\partial(K_{i,t} = k_{i,t})} \right) [FPI_{j(in),(t+1)-t} - FDI_{j(in),(t+1)-t}] = \Delta(k_{i,(t+1),t} \delta_{j(j),(t+1),t}) - \Delta(k_{i,(t+1),t} \delta_{j(i),(t+1)-t})$$

Or

$$\Delta FPI_{j(in);(t+1),t} - \Delta FDI_{j(in);(t+1)-t} = \Delta \delta_{j(j),(t+1)-t} - \Delta \delta_{j(i),(t+1)-t} \quad (25)$$

*In equilibrium, considering country j*

To understand the behavior of these two sources of capital at equilibrium we hold  $Q_{S:t} = Q_{D:t}$  and consider the perspective of country j.

$$\begin{aligned} k_{i,t}((P_{j,t} + (\delta_{j(j),t} - \delta_{j(i),t})) - \phi_{j,t}) + K_{i,t}(P_{j,t} - \phi_{j,t}) \\ = k_{i,t}((\phi_{j,t} + (\delta_{i(j),t} - \delta_{i(i),t})) - P_{j,t}) + K_{i,t}(\phi_{j,t} - P_{j,t}) \end{aligned}$$

If:  $\delta_{j(j),t} = \delta_{i(j),t} = \delta_{j(i),t} = \delta_{i(i),t}$ , then both countries have accurate expectations about the relative sentiment dynamics between the source and recipient countries.

Using this assumption of equivalent relative effects in supply and demand functions we are able to simplify our equilibrium pricing model to the simple conclusion.

$$P_{j,t}^* = \phi_{j,t} \quad (26)$$

Under these circumstances with perfect competition assumptions such as frictionless international capital mobility, equilibrium prices will equal the fundamental value and result in no distortion in terms of financial or real outcomes.

#### *Imperfect Markets*

$$\delta_{j(j),t} \neq \delta_{i(j),t}, \delta_{i(i),t} \neq \delta_{j(i),t}$$

In this case we assume that the relative effects of sentiment on supply and demand functions are not equal or zero.

$$\begin{aligned} k_{i,t}((P_{j,t} + (\delta_{j(j),t} - \delta_{j(i),t})) - \phi_{j,t}) + K_{i,t}(P_{j,t} - \phi_{j,t}) \\ = k_{i,t}((\phi_{j,t} + (\delta_{i(j),t} - \delta_{i(i),t})) - P_{j,t}) + K_{i,t}(\phi_{j,t} - P_{j,t}) \end{aligned}$$

$$P_{j,t}^* = \frac{k_{i,t}[-\delta_{j(j),t} + \delta_{j(i),t} + 2\phi_{j,t} + \delta_{i(j),t} - \delta_{i(i),t}] + 2K_{i,t}\phi_{j,t}}{2(k_{i,t} + K_{i,t})}$$

$$P_{j,t}^* = \frac{k_{i,t}[\delta_{j(i),t} - \delta_{j(j),t} + \delta_{i(j),t} - \delta_{i(i),t}]}{2(k_{i,t} + K_{i,t})} + \phi_{j,t} \quad (26)$$

This final expression is similar to (16), however here we find that equilibrium price levels are a function of the manner in which capital investors perceive sentiment in the destination country, in comparison with sentiment in the source-country. Assuming suppliers of international investment opportunities exhibit rent-seeking tendency, then the impact of their catering behavior affects equilibrium prices in terms of their perception of the sentiment differential over the two countries.