Capital Flows and Asset Values: A Review of the Literature and Exploratory Investigation in a Real Estate Context

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This paper reviews the existing general finance literature on capital/investor flows and asset pricing with specific emphasis on the implications of the findings for real estate. The paper reviews the key elements of important papers within a framework that carefully synthesizes and ties together the main findings and real estate implications for both private and public market valuations. The papers surveyed here examine the linkages between flows & returns as well as measures of sentiment and deviations of price from fundamental value and differ in their asset market focus (domestic equities, international equities, closed-end fund, foreign exchange), frequency of data (monthly and daily) and time periods covered. Based on the review and synthesis of results the conclusion reached here is that at most times there is not a direct causal link between flows and returns (or asset values); they simply respond to the same fundamental economic news and provide a barometer of market liquidity. However, in certain "extreme" environments capital flows are related to mispricing of assets that is related to the interaction of uninformed traders and limited arbitrage. This is quite consistent across different asset markets.

Keywords: Capital Flows, Frictions, Learning, Limited Arbitrage, Sentiment, Securitization

Introduction and Background

"The story of finance is one of innovation, crisis, and consolidation… Technological, demographic, or industrial change creates an essentially new financial demand. After a few false starts, some new invention – an instrument, a trading methodology – brilliantly meets the challenge. An exuberant development period follows, as more and more firms pile in to take advantage of the sudden opportunity. Exuberance quickly becomes gross excess, precipitating a crisis. The subsequent crash burns off the excesses, buyers and sellers adjust their expectations, regulators update their rules and alarm systems, and yesterdays brilliant innovation becomes just another of the industry's workaday departments."[1]

Commercial real estate is a cyclical, capital intensive, industry. There is significant anecdotal evidence that past private real estate cycles were strongly related to net mortgage flows (availability of construction and permanent debt). Figure 1 illustrates the close connection between flows and real estate values. It plots aggregate net mortgage flows and property returns derived from the NCREIF index (a de-lagged or unsmoothed version of it). With debt financing widely available,

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[1] From Money, Greed and Risk: Why Financial Crises and Crashes Happen, by Charles Morris, 1999, Times Business, Random House.

property values increased in the 1980s, but they fell substantially when the supply of debt was sharply curtailed in the early 1990s. The close association between debt flows and property values in the past has led to the perception held by many market participants that there is a systematic relationship that can potentially be exploited to understand the state of property investment markets; mortgage flows drive private property values.[2]

Based on the close association between mortgage flows and property values in the past, many market participants apparently still believe that monitoring of real estate (private) debt capital flows remains a fruitful exercise today.[3] However, Figure 1 also shows that the link between private property returns and mortgage flows has not been the same since the early 1990s liquidity crisis. The correlation between real estate performance and debt capital flows is not as high as it previously was. The real estate world has changed significantly since the early 1990s in ways that suggest this may no longer be a relevant exercise. A structural change that took place in the real estate finance arena in response to the downturn and lack of debt financing, and real estate finance moved from primarily "Main Street" to both "Main Street" and "Wall Street" with the emergence of CMBS on the debt side and explosive growth in the REIT sector on the equity side.

Securitization has permanently changed the real estate landscape. It has been a welcome development by many real estate market participants who believe that public markets are more forward looking than private markets and therefore help to enforce a discipline on real estate market capital flows that will prevent a reoccurrence of the late 1980s/early 1990s boom buts episode. This

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[2] The link between the availability of mortgage debt, the mispricing and resulting overbuilding in commercial real and the role of and impact on commercial banks in this period has been widely documented. See for example Giliberto (1993), Mejia (1999), Herring and Wachter (1999) and Hilbers et. al. (2001), and the Federal Deposit Insurance Corporation's History of the Eighties (available at www.fdic.gov)

[3] See for example the article, "Commercial Banks and Real Estate Cycles," in PricewaterhouseCooper's Real Estate Cycles, Year-end 2001. Chapter 3 of the widely-circulated annual PWC Lend Lease Emerging Trends in Real Estate, is titled "Capital Flows" and looks directly at this issue.

is especially true on the debt side where the growth of the CMBS market has been viewed favorably as a regulator of capital flows to real estate.[4] On the equity side, there are concerns, however that the "excess volatility" that characterizes stock markets, if due to market inefficiency could spillover into real estate markets. The changing structure of the commercial real estate market has led to an increased importance of equity flows into public market real estate vehicles (REITs and REIT mutual funds). It has been suggested that part of the run-up in REIT prices in the 1995-98 period was due to excessive optimism on the part of less than rational investors. Figures 2 and 3 shows that the flow of equity funds into REITs are closely tied to REIT valuations. Hence, it is crucial that any study of the link between capital flows and real estate pricing consider both the public and private markets, both debt and equity, and the interactions between these.

More recently the reasonableness of real estate values, both public and private, have been called into question again as significant capital has flowed into the real estate sector given the dismal performance of the stock market. "Real estate pricing increasingly appears to be driven more by capital flows and the availability of cheap debt, than by current and future property earnings," [AEW Capital Management as reported in the *Wall Street Journal*]. Along these lines there has been much stated and written in the real estate press about the apparent disconnect between deteriorating real estate fundamentals (space market) and stable or increasing property values presumably driven by "excess" capital flows into the real estate sector.

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[4] For interesting discussion and thoughts on the "new" real estate markets see Douglas D. Abbey, "The Real Estate Cycle is Over, True or False?" *PREA Quarterly*, Fall 2001, as well as comments on the paper by Michael Giliberto and Mike Miles in the same issue. See also Anthony Downs, "How securitization affected 'traditional' real estate cycle," *National Real Estate Investor*, February 1, 1999, and "The Power of Public Debt Markets," in Chapter 3 Emerging Trends in Real Estate 2002.

Partly due to data limitations, there has been relatively little academic work aimed at understanding the role of capital flows in real estate pricing dynamics. In contrast, as an offshoot of the emerging behavioral finance literature, general finance researchers have begun to explore the impact of capital flows on asset values and the role of "investor sentiment" as a driver of capital flows. There are growing literatures that examine the impact of mutual fund flows on stock returns, the role of trading volume and turnover in stock pricing and the role of investor sentiment in the timing and clustering of initial public and seasoned equity offerings.

This paper reviews the existing literature on capital flows and asset pricing. It focuses on studies that examine the *incremental* impact of flows on the prices of assets traded in organized public markets (stocks, bonds and foreign exchange), though it also covers recent work on the effect of capital fund flows on venture capital investment values. The main text of the paper will review the key elements of important papers within a framework that carefully synthesizes and ties together the main findings and real estate implications for both *private* and *public* market valuations. It also provides directions for future research.

Capital Flows and Asset Values: The Issues and Theoretical Considerations

Practitioners seem to believe that asset values are driven in part by investor appetites, flows and trading activity and are only loosely connected with fundamentals, at least in the short-run. They spend considerable effort trying to understand market sentiment (i.e. what other investors might do), rather than focusing solely on cash flow and discount rate considerations. A growing body of academic work to be surveyed in this paper documents a positive contemporaneous relationship between fund/capital flows (net flows into equity mutual funds, foreign exchange order flow, venture capital), as well as trading activity/volume, and underlying asset values. Many in the

financial press and practitioner communities take this as evidence that capital flows in part drive (cause) asset values. Consider the following from a 1997 *Business Week* article concerning the link between flows of money into mutual funds and the performance of the stock market:

> *Popular theory holds that they have been the yeast in the Dow's rise….(title).*
> *"Mutual fund investors are doing to stocks in the 1990s what they did to real estate in the 1980s, sharply marking up prices,"*

The findings by some that flows respond to returns [i.e. high (low) returns lead to in (out) flows], reinforces this notion as it provides evidence of both price pressure and trend chasing behavior (positive feedback trading) by investors. This is not necessarily the case, however. The correlation between flows and returns is not sufficient to infer causality between flows and asset prices. The positive correlation may not in fact imply causality. Both flows and asset prices could be caused by (or positively associated with) other economic factors (e.g. expectations of corporate profits). That is, the contemporaneous positive correlation between flows and returns may have nothing to do with flows having a direct causal link to returns. Flows may passively respond to fundamental information rather than reveal it. Hence, flows may contain no information about fundamentals or about deviations from fundamentals that are useful for forecasting prices. **The question that needs to be addressed,** then is

> *Do capital flows have a <u>real</u> impact on asset prices? That is, do capital flows drive asset values after accounting for market fundamentals or is capital simply flowing into assets at times of high growth opportunities. In the former case it impacts pricing whereas in the latter case it does not.*

The Efficient Markets Hypothesis (EMH) paradigm has long dominated the academic approach to asset valuation. Under the EMH, the current value of an asset is the risk-adjusted discounted present

value of expected future cash flows; there is no role for capital flows or trading activity to directly impact asset valuations. A central premise of the EMH is that "the price is right", and hence observed market prices do not differ from underlying "true" fundamental value. Under the EMH any deviation from fundamental value represents a profit opportunity that is quickly eliminated through the actions of rational traders who are constantly on the lookout for such opportunities. Underpriced assets are bought while overpriced assets are sold short, thereby bringing prices back in line with fundamental value. This costless arbitrage lies at the heart of the EMH. Competition for abnormal profits along these lines ensures that demand curves for individual stocks are flat, which implies that any shocks in asset demand unrelated to fundamentals do not impact prices. Prices equal fundamental value because the trading actions of rational arbitrageurs prevent the trades of any nonrational (or noise) traders from having a price impact. With a flat sloping demand curve, fund flow and trading activity variables cannot impact prices. Equity fund flows should affect share prices and returns only to the extent that they affect the fundamentals, which is through the information effect.

Given the historical dominance of the EMH paradigm, academic finance theory has not had much to say about trading activity and fund flows variables. This contrasts sharply with practitioner behavior in which technical trading rules based on money flows, transaction volume and market liquidity proxies are widely utilized in guiding investment timing decisions. This has changed in recent years as more researchers have seriously questioned the efficient markets hypothesis and brought behavioral economics to the forefront of academic finance.

The behavioral approach posits two important shortcomings of the EMH. First, it explicitly recognizes that some investors are not rational in their behavior; systematic biases in beliefs imply

that some investors trade on non-fundamental information. Second, the behavioral approach questions the ability of the complete arbitrage mechanism that underlies the EMH and works to ensure demand curves for stock are flat. More precisely, the behavioral approach suggests that this arbitrage is not perfect because arbitrageurs are subject to fundamental (market) and noise trader risk and also face non-trivial transactions and implementation costs that prevent them from taking fully offsetting positions to correct mispricing.

The imperfect nature of the arbitrage mechanism would seem a natural for the private real estate asset market. Illiquidity and high transaction costs in direct real estate implies large arbitrage costs, which further limits the ability of sophisticated traders to enter the market and eliminate mispricing. Pontiff (1996) argues that arbitrage costs can lead to large deviations of prices from fundamental value, and he provides evidence that deviations in closed end stock fund prices from net asset value (NAV) are related to arbitrage costs. He interprets this finding as consistent with noise trader models of asset pricing. In addition to being characterized by significant market frictions, private real estate asset values are generally "noisy" indications of true value, adding another layer of risk to the arbitrage.

Recent work on the limits of arbitrage has focused on the importance of short sale constraints in public securities markets, both in terms of cost and institutional restrictions that restrict the ability the ability of investors to sell stocks short. Specifically, in a world of heterogeneous investors, the existence of short sale constraints can generate deviations in asset prices from fundamental value. Optimistic investors take long positions, while pessimistic investors would like to take short positions. Short-sale constraints, however, inhibit the ability of rational investors to eliminate overpricing and imply that they sit on the sideline when they believe prices are too high, and also

that irrational investors are only active in the market when they are overly optimistic. Hence, in up markets asset values reflect the sentiment of these irrational traders. When they are too pessimistic they cannot act by shorting and are forced to the sidelines [Gervais, Kaniel and Mingelgrin (2001) and Baker and Stein (2002)]. Investor sentiment is directly linked to trading (turnover) and liquidity.[5] The interaction of limited arbitrage and heterogenous investor beliefs has led to an interesting class of models in which trading by nonrational investors can drive asset prices away from fundamental value.

Does Uninformed Demand Affect Stock Prices?: Studies of the Price Pressure Effect

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[5] In addition to short sale restrictions, rational investors are unable to arbitrage away the mispricing because the unpredictability of investor sentiment exposes them to "noise trader risk" as in DeLong, Shleifer, Summers and Waldman (1990).

Individual Stocks

Ideally, to distinguish between the price pressure and information hypotheses and thereby test whether or not the demand curve for stocks is perfectly elastic requires a situation in which there is an exogenous change in demand without an accompanying change in the information environment that affects fundamental value. One such event that some researchers suggest provides such a setting is the inclusion or exclusion of stocks from the S&P 500 index. Under the EMH, the addition of a stock to the index should not, in principal, affect the fundamental value of a firm's shares and hence the change in demand created by the index redefinition should not impact the price of the firm's shares. Harris and Gurel (1986) and Shleifer (1986) report that stocks added to the S&P 500 jump in value an average of just over 3 percent and that the jump is related to trading by index mutual funds. The authors interpret their findings as evidence in support of the idea that trading by nonrational (or uninformed) investors affects asset prices in a trading environment characterized by limited arbitrage.

While these results are consistent with a demand pressure story, others have offered explanations consistent with the EMH, or have criticized the approach as not representing a pure exogenous, non-information event that also suffers from a small sample bias. One fundamental that might be expected to change with index inclusion is liquidity. A permanent increase in liquidity and commensurate decrease in trading costs would generate a potentially significant price increase when considered in present value terms. However, studies of changes in bid-ask spreads following index inclusion indicate no permanent reduction in trading costs. In addition, Kaul, Mehrotra and Morck (2000) find the same price effects are associated with a reweighting of the existing stocks in the Toronto Stock Exchange (TSE 300), a result that is largely inconsistent with a rational

liquidity/transaction cost explanation since the stocks are already included in the portfolios of index funds.

Two recent innovative studies revisit the issue of the elasticity of the demand curve for stocks. Wurgler and Zhuravskaya (2002) study the announcement effect for stocks added to the S&P 500 as a means of empirically testing their theoretical model of the shape of the demand curve for individual stocks. They develop a theoretical model characterized by heterogeneity of investor beliefs, and risky arbitrage. The model predicts that an individual stock's price response to an exogenous demand increases with the shocks size and the stock's arbitrage risk. Consistent with the model predictions that risk limits complete arbitrage, they find that stocks with high arbitrage risk – those without close substitutes - exhibit significantly larger price increases upon announcement of index inclusion, a result consistent with a downward sloping demand curve.

Barberis, Shleifer and Wurgler (2002) examine the impact of data revisions in the S&P 500 index on a stock's relationship with other stocks in the index, as well as those outside the index. They find when a stock is added to the S&P 500 index its correlation with the index increases (both beta and R-squared), while its correlation with other similar matched stocks outside the index decreases. Their empirical analysis is used to test what they call a "trading-based" model of comovement in the stock prices of securities. Comovement refers to tendency for groups of like stocks to exhibit common return patterns. Strong patterns comovement in returns have been documented for closed-end funds, value stocks, and stocks in the same industry (internet-related & REITs for example).[6] Barberis, Shleifer and Wurgler (2002) note that the EMH explains comovement in prices as a function of comovement in market fundamentals (cash flows and risk adjusted discount rates). The

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[6] Comovement is related to the industry effect that has been proposed to explain the documented momentum effect in stock returns [Grinblat and Moskowitz (1999) and Jegadeesh and Titman (2001).]

authors, however, suggest that the fundamental story is incomplete and offer an explanation based on investor trading patterns. Correlated trading can arise from correlated investor sentiment and lead to comovement in different stock "categories" as noise traders move from one category to another. In such a world there will be common factors in returns of stocks in the same category that may be only weakly related to cash flows fundamentals. There is a role for uninformed demand to impact prices in a coordinated fashion with "similar" stocks. This last finding meshes well with studies of mutual fund flows and aggregate stock market performance, to which we now turn our attention.

Mutual Fund Flows and Aggregate Stock Prices

The papers cited in the previous section provide evidence to support the notion that supply and demand affect individual stock prices, independent of market fundamentals (i.e. the price pressure hypothesis). This section summarizes a group of papers that test for price pressure affects at the stock market or aggregate level. More precisely, the papers discussed below aim to answer the following two questions:

Do mutual fund flows affect (drive or cause) stock price change?

Do stock returns influence (cause) mutual fund flows?

Many in the financial press and investor community would immediately answer yes to both questions. That is, they adhere to the belief that flows of funds directly impact asset prices, consistent with the price pressure story. In fact, sharply increased flows of funds into equity mutual funds have been blamed as a major force behind the strong and sustained run-up of stock prices in the 1990s. This belief also transcends some of the academic community. Shiller (2000) suggests that the proliferation of equity mutual funds has enticed more uninformed investors to participate in the market. He claims the result has been a relatively greater focus on the market as opposed to

individual stocks as naïve investors speculate on market or sector-wide movements through mutual funds. The implication is that there is a direct link between the growth in mutual funds and the level of stock prices, one that potentially has direct application to the REIT market of the 1990s.

Edwards and Zhang (1998) urge caution in making such sweeping unfounded generalizations. They warn that the argument in support of this direct link is "deceptively appealing"; equity mutual fund growth implies a greater demand by individual investors to hold stock, and this "price pressure" results in higher stock prices as more investors chase a relatively fixed supply of equity. Similarly when mutual fund investors redeem units en masse stock prices suffer. Hence, mutual fund flows are a widely followed barometer of investor sentiment.

Motivated by such practitioner claims and the apparent lack of rigorous analysis to support them, academics have begun to seriously examine the relationship between the flows of funds into open-ended mutual funds (MF flows) and aggregate stock prices. A number of papers specifically aim to discriminate between the price pressure and information theories. A common theme motivating research in this area is that despite practitioner claims little is actually known about the direct effect of MF flows on the prices of the underlying assets owned by mutual funds. While there exists a statistically significant correlation between MF flows and stock returns, a necessary condition for causation, this by itself is not sufficient to infer causality between MF flows and stock prices. The positive correlation could be related to a sentiment-based explanation with higher MF flows causing higher stock prices, but it is also consistent with an information-based, efficient markets (EMH) story in which both flows and asset prices could be caused by (or positively associated with) other economic factors (expectations of corporate profits) with no direct causality running between them. As noted by Warther (1998), if mutual fund investors simply trade in the same direction as another

group of investors who possess information then their trades will be associated with new information. As the market responds to this information revelation, prices will move in the same direction as the flow of funds, and returns will be positively correlated with flows. In the this scenario the market is not responding to fund flows because of price pressures but rather reacting efficiently to new information.

Warther (1995, 1998) was one of the first to empirically examine the link between aggregate stock market performance and mutual fund flows, with the ultimate goal of distinguishing between the information and price pressure hypotheses to determine if the rapid growth of the mutual fund sector was a destabilizing influence on the stock market. He suggests that MF flows are a logical place to look for indicators of unsophisticated investor sentiment, because mutual fund investors are considered by many to be the least informed investors in the market. The popular press often notes that fund flows are considered a yardstick of small-investor sentiment, and implies this sentiment is not completely rational.

Warther (1998) employs monthly Investment Company Institute (ICI) MF flow (net sales) data for all stock funds over the 1984 to 1996 period. His analysis comprises three main empirical parts: (i) statistical times series properties of the MF flow series, (ii) contemporaneous link between MF flows and aggregate stock returns; and (iii) the relationship between lagged MF flows (returns) and contemporaneous returns (flows). He finds substantial persistence, and hence predictability in the level of flows over time. An AR(3) model explains 66% of the variation in flows with positive and statistically significant coefficients on the parameter estimates.

Warther decomposes net MF inflows into expected and unexpected components, with expected MF inflows a linear model of the past three months flows, and unexpected flow is the residual from the

expected flow regression. Regressing returns on contemporaneous MF flows, he finds a statistically significant positive relationship, but that realized flows do not explain a large part of the variation in stock market returns (the R-squared is 8%). However, when realized flows are broken out into expected and unexpected components there is a large positive and highly significant coefficient on unexpected flow and small, negative, marginally significant coefficient on expected flow. In addition, the explanatory power of flows on contemporaneous returns jumps significantly to 47%. Hence, while it is often claimed that the level of MF flows directly affects stock prices, this is not actually the case; aggregate returns are strongly related to deviations between the actual MF flow level and the expected flow level.

Having established a strong contemporaneous link, Warther (1995, 1998) examines the dynamic lead-lag relationship between flows and returns. A prerequisite for noise or sentiment-based trading is that mutual fund investors are chasing market returns after the fact, which would show up as a positive relation between market returns and subsequent mutual fund flows. Regressing unexpected flow on returns lagged one month, Warther finds a negative (and statistically significant) coefficient, a result opposite of what we would expect if investors chase returns. At monthly frequencies mutual fund investors tend to be somewhat contrarian. Hence, at this frequency anyway mutual fund investors are not a destabilizing force – they are moderately stabilizing. Warner then looks for causation the other way and regresses next periods realized return and current expected and unexpected flow components and finds no significant relation exists between the two. Information about future flows contained in current flows cannot be used to predict future returns.

Summarizing Warther's (1995, 1998) findings, the data on mutual fund flows indicates a very strong contemporaneous relation between flows and returns. This indicates either a link from flows

to returns or returns to flows, or a link in both directions. His attempts to distinguish between these are inconclusive, however. No positive relation is found between returns and subsequent flows and no relation is found between flows and subsequent returns. In addition Warther (1995) does not find any evidence that returns are negatively related to past flows; that is no evidence in support of price reversals. His finds are inconsistent with the price pressure story, although the price pressure tests are not very powerful. Warther rejects both sides of a feedback trading model arguing that security returns neither lead nor lag MF flows.

Edelen and Warner (2001) and Goetzman and Massa (2003) argue that with monthly frequency data one cannot reject the hypothesis that feedback trading is occurring at a higher frequency than the data. That is, monthly frequency data could be hiding the true dynamics and hence really precludes us from providing a definitive answer to the question, do mutual fund investors respond to market movements? Since a very strong correlation is found at monthly frequency, over shorter horizons it is possible that mutual fun investors are vigorous feedback traders. In support of this Edelen and Warner (2001) find that there is also a strong contemporaneous relation at the daily frequency and in contrast to the monthly data here that there is some evidence of a significant relation between returns and subsequent flows.

Goetzman and Massa (2003) investigate the link between fund flows and aggregate stock prices using daily data on three S&P500 index mutual funds and movements in the S&P 500 index, arguing that index funds have the advantage that flows are not based on perceptions about the stock picking ability of the fund manager but beliefs about the direction of the market as a whole. Consistent with previous studies they find a strong contemporaneous correlation between fund inflows and returns to the S&P 500 index. They also find a negative correlation between fund

outflows and S&P 500 returns. Investigation of lagged dynamics reveals that at a daily frequency there is some evidence that poor performance predicts subsequent outflows, but there is no evidence at this frequency that inflows respond to upward market moves with a lag. Finally, Goetzman and Massa (2001) also investigate whether demand shocks to index funds have permanent or temporary prices effects and provide evidence that they are permanent, which supports the price pressure hypothesis.

Goetzman, Massa and Rouwenhorst (2000) study the factors affecting variation in daily net inflows to a large number of U.S. mutual funds over an 18-month period covering in 1998 and 1999. They report finding a strong common component to mutual fund flows. They find that flows into equity (stock) funds are strongly negatively correlated with flows into money market precious metal funds, and that flows have a strong link with contemporaneous daily mutual fund (as opposed to agrregate stock) returns. The authors propose a test of the importance of flows to mutual fund returns by incorporating flows as a variable in a return regression. That is, they test the incremental explanatory power of flows to explain cross-sectional differences in realized returns, and find that fund flow factors add significant incremental explanatory power. Goetzman, Massa and Rouwenhorst (2000) conclude that their evidence is consistent with a pervasive investor sentiment variable.

Additional evidence comes from work done on mutual fund flows at the micro level that examines the returns to individual funds [Sirri and Tufano (1998) for example] there a positive relation between fund performance and flows has been well documented – though this is only suggestive of feedback trading. Specifically they find that investors tend to move cash into funds that had the highest returns in the preceding year. One must be careful in generalizing from this micro approach

to the macro/market environment. They are important fundamental differences. Much of the flow into individual funds is between one fund and another – one funds gain is another's loss. Thus micro studies focus attention on the how funds compete against each other to attract investor dollars. At the macro level flows between funds net out so only aggregate flows into and out of the entire market remain. Thus attention at the macro level centers on large-scale movements of money into and out of the market without regard to which fund it goes to or comes from.

Irrespective of the data frequency issue, Warther's (1995, 1998) initial pioneering efforts have been criticized as being somewhat too simplistic. Subsequent papers move beyond simple relationships between aggregate flows and returns, by incorporating additional financial and macroeconomic variables into a system specification and employing more sophisticated time series econometric techniques.

Edwards and Zhang (1998) investigate the relationship between aggregate monthly mutual fund flows and aggregate market returns for both stock and bond markets over a 30-year period from January 1961 on to 1996. They employ both Granger causality and structural systems estimation methods. Granger causality tests are similar to Warther's (1995, 1998) lead lag regressions augmented with formal statistical tests of directional causality between flows and returns. Consistent with Warther they find that asset returns the net flow of funds into MFs, but fund flows do not affect assets returns overall, though there is some evidence that equity MF flows do affect aggregate stock returns during periods of poor market performance. Edwards and Zhang view the Granger causality tests as a preliminary investigative tool only. They argue that by considering only lead-lag relationships these types of tests do not utilize potentially valuable information contained in contemporaneous data to infer causality.

Edwards and Zhang (1998) also offer a richer structural model approach. They estimate a two-equation system with MF flows (unexpected flows, similar to Warther) and aggregate returns specified as endogenous variables. Exogenous variables include industrial production, interest rates, terms structure and default premia as well as a demographic variable to capture the increasing importance of mutual funds as a savings vehicle. They estimate the two equations as a simultaneous system with MF flows included as a "factor" in the return equation and returns included in the MF flow equation. Test the significance of these two coefficient estimates. The inclusion of exogenous macro variables purges both MF flows and asset returns of the simultaneity that may exist because of their relationship with other macro variables. Consistent with the Granger causality tests and previous work, Edwards and Zhang (1998) find strong evidence to suggest that returns "cause" flows, but do not find any evidence to support the notion that fund flows affect returns.

Fortune (1998) studies the dynamic effects of security returns on mutual fund flows and the possibility of a reverse transmission from flows to security returns, within a framework similar to Edward and Zhang (1998).[7] He also adds a new dimension by attempting to relate the documented link between returns and MF flows to the positive feedback and momentum literatures. Fortune proposes a vector autoregressive (VAR) framework and in addition to exogenous macroeconomic variables incorporates returns and flows on bonds and mixed (or hybrid) mutual funds, hence testing to see if fund flows are related to relative rates of return across different fund categories. Similar to previous studies, Fortune finds that MF equity flows are affected by past returns and in contrast to earlier work that realized returns do affect subsequent MF flows. That is, he documents causation from security returns to MF fund flows, as well as some evidence of reverse causation from fund flows to security returns.

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[7] See also Remolona, Kleiman and Gruenstein (1997).

Cha and Lee (2001) provide the most extensive investigation of the dynamics of the link between MF flows and aggregate stocks prices to date. Their main goal is to actually examine whether the demand curve for stocks is downward sloping. However, in contrast to studies discussed previously that focus on the demand curves for individual shares they employ equity mutual fund flows as a proxy for the aggregate demand for stocks. They argue that using the aggregate demand curve for the stock market index portfolio allows the focus to be on the price pressure versus information effects since the substitution effect is neutralized, by using a basket or index of all stocks. In addition, a horizontal (flat) aggregate demand curve is a sufficient condition for flat individual stock demand curves. Their study provides a nice bridge between the index inclusion and mutual fund flow studies cited above.

Cha and Lee (2001) employ a novel two part empirical testing strategy to quantify the impact of MF fund flows on stock returns, and specifically distinguish between the price-pressure effect and information effect theories of the operation of the stock market, within a framework that allows for both and calibrates the relative importance of the two effects. First, with a variation of the Campbell & Shiller stock price present value model that allows for both the information effect and the price pressure effect. Second, by causality tests in the presence of other fundamentals that allow for dynamic feedback effects between flows and returns (vector error-correction model (VECM)).

Overall, Cha and Lee (2001) do not find evidence to support the idea that MF flows directly affect stock prices (i.e. the price-pressure hypothesis) in the presence of other market fundamentals. Consistent with previous studies they find that flows respond to returns. They interpret this as indicative of investors trying to forecast fundamentals and changing their demand for stocks

accordingly. In contrast to micro-based studies of additions of individual stocks to the S&P 500 they conclude that the market demand curve for stocks is flat. However, one potential problem with the aggregate time series approach to estimating the shape of the demand curve for stocks employed here is that it ignores the potential asymmetry of the impact of fund flows on stock prices. That is, the tests may not be very powerful because they do not take into account the fact that flows tend to have a greater impact in an upmarket than in a down market, as documented by Edward and Zhang (1998) for example.

Karceski (2003) presents additional empirical evidence on the link between MF flows and stock returns. The focus of his paper is a theoretical model that aims to explain the documented inability of the Capital Asset Pricing (CAPM) to correctly price systematic. A key assumption of the model is that MF investors chase returns through time causing aggregate equity MF flows to lag aggregate returns. He empirically verifies this and shows that the relationship is economically large; MF fund flows are positively related to both contemporaneous and lagged equity returns. He also reports that aggregate mutual fund flows are more sensitive to market returns in months with unusually large returns; large fund inflows occur after market run-ups.

Karceski's (2003) model is also interesting in that it provides a direct mechanism by which fund flows affect share prices, especially in up markets. His model is motivated by three key stylized facts; (i) mutual fund investors chase returns and put money into funds after they have performed well; (ii) high beta stocks outperform low beta stocks in bull markets, and (iii) MF managers care only about outperforming their peers. The second two points imply that managers have an incentive to tilt their portfolios towards higher beta stocks in bull markets, and they care more about outperforming their peers during good times than other times because MF investors chase returns

through time. Hence, in bull markets managers of actively managed MFs shift portfolio holding towards higher beta stocks. Hence with demand up, price increases (and future returns fall for higher beta stocks, a backwards result in terms of the link between beta and returns).

Gompers and Learner (2000) study the relationship between flow of funds (commitments) into venture capital funds and the valuation of new investments (firms) financed by the VC funds. They aim to answer the question, w*hat is the causal link between fund flows and private equity values?* Does more money flowing into venture capital funds drive up the value of investments? That is, does too much money chasing too few "deals," drive up the value of investments financed by these funds? [*Exogenous shift in demand / sentiment or demand pressure explanation*]. Or alternatively, do increases in expected future cash flows, or a reduction in the riskiness of investments lead to both higher valuations and greater flow of funds into venture capital financing vehicles? That is, flows result from expectations of strong future performance not past performance, and hence flows do not cause investments but respond to prospects [*rational* contemporaneous link between flows and valuations]. By focusing on a specific sector the authors provide a more direct test of the price pressure hypothesis, and one that is quite relevant to private real estate and the link between REITs and private real estate.

Gompers and Learner (2000) formally to if values of venture capital investments are positively related to venture capital fund inflows, after controlling for other factors that should impact values, both firm-specific and industry wide. They have access to a proprietary database that tracks ven-cap financing and they develop a hedonic pricing model to value venture capital investments as a function of: age, stage of development, industry, public market valuation of firms in same industry (industry group valuations, industry book to market, industry earnings to price ratio). They find a

strong positive relationship between the private equity value of venture capital investments (firms) and inflows into venture capital funds, after controlling for other factors. They undertake a significant number of robustness checks (alternative model specifications) to gain confidence in the results, and conclude that causality runs from flows to asset value and that inflows to ven-cap funds have a significant real impact on the values of the private investments they finance, after controlling for other factors. Importantly, the impact of fund flows is most pronounced in periods with larger ven-cap activity and also the probability of refinancing is positively related to level of venture capital fund inflows. These findings are consistent with the demand pressure/sentiment explanation of the link between fund flows and valuations. Given the private nature of the firm's financed by venture capital, there would appear to be important direct connections with the private real estate market, especially on the development side.

Flows, Sentiment and Deviations in Price from Fundamental Value

The previous section examined the link between flows and pricing at the market and sector (or category) level. The important question – do "excessive" flows drive price away from fundamental value, and hence have real costs, was not directly addressed. The papers surveyed in this section are directly related to earlier papers in many ways but specifically focus on the identification and calibration of the impact of correlated sentiment-based noise trading on asset values divergences from fundamental value in a world of limited arbitrage.

One of the first "categories" studied by researchers investigating sentiment-based pricing phenomenon was closed-end funds (CEFs). Lee, Shleifer and Thaler (1991) proposed that changes in discounts on closed end funds are driven by correlated changes in investor sentiment; they also consider mutual fund flows to be another measure of investor sentiment. Gemmill and Thomas (2003) provide recent empirical support for the sentiment-based explanation of fluctuations in the

discount to NAV in CEF pricing.[8] They show that (retail) investor flows into open-ended mutual funds, proxying small investor sentiment, are related to changes in the discount on closed-end funds that invest in similar baskets of securities. They conclude that Consistent with the DSSW noise trader model find that changes in discounts are a function of time-varying noise-trader demand (as proxied by retail investor flows).

Brown and Cliff (2002) examine the link between various measures of investor sentiment and proxies of deviation in stock price from fundamental value. Specifically they study the relationship between direct (surveys, investment newsletters) and indirect measures (mutual fund flows, IPOs, advances/declines, margin/short selling) of investor sentiment and systematic mispricing of stocks. Interestingly they infer direct sentiment measures from both individual and institutional surveys to test the often-quoted proposition that individual investors are likely to be the irrational noise traders. The authors find that mutual fund flows are positively related to sentiment indicators. In addition, both individual and institutional sentiment are strongly related to their past levels and recent large stock returns, and market returns are strong predictor of subsequent levels and changes in both individual and institutional sentiment; sentiment, including flows respond to returns. Sentiment measures, however, are not useful in forecasting stock returns over short horizons, though they do have predictive power out 2 to 3 years. Sentiment measures are also related to estimates of deviations of stock prices from intrinsic values.

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[8] Both Lee, Shleifer and Thaler (1991) and Gemmil and Thomas (2003) aim to test the central propositions of the DeLong, Shleifer, Summers and Waldman (DSSW, 1990) model of investor sentiment (noise traders) and stock prices. DSSW (1990) present a model in which asset market outcomes are the result of a contest between rational arbitrageurs and noise traders, whose expectations are sentiment-based. Arbitrage is limited because of the presence of noise trader risk, or the risk that noise trader beliefs will not revert to their mean for a long time and might even become more extreme. The result is that the price of an asset may fluctuate in a band around fundamental value with the width of the band depending on the cost of arbitrage and the number of noise traders. Gemmil and Thomas (2003) suggest argue that closed-end funds provide an ideal laboratory in which to test for the impact of noise trading, because unlike stocks in general we have both the fund unit price and net asset value (NAV) per share of the stocks held by the fund.

While the majority of the papers surveyed deal with the stock market, the foreign exchange market has also attracted significant attention as a laboratory to study the dynamics of investor flows and asset prices. A large body of academic work has shown that contemporaneous, measured macroeconomic fundamentals do not explain short-run exchange rate changes. In addition considerable evidence has been building that investor flows and trading positions matter. Evans and Lyons (2002) find that daily interdealer order flow explains a significant proportion of daily exchange rate changes. They do not, however, advocate a sentiment-based irrational investor story to explain this finding. Instead, they argue that investor flows cause exchange rate changes through private information, which when released, permanently and positively, impacts exchange rates returns. Evans and Lyons find no evidence that flows predict returns, but argue that the strong daily contemporaneous correlation is a result of intraday information release that is important for exchange rate determination. Presumably this information concerns future fundamentals (i.e. information that has long-lasting impacts on excess returns). If this view holds investor flows should have permanent impacts on exchange rates. That is, flows are actually a fundamental.

Froot and Ramadorai (2002) go further than Evans and Lyons in terms of examining the empirical implications of their model and placing it within a larger set of views. Importantly they examine the potential for flows to be related to short-run overvaluation in asset markets (i.e. related to deviations from fundamental value). They term the Evans and Lyons (2002) hypothesis the 'strong flow-centric view' of exchange rate dynamics. Froot and Ramadorai (2002) put forth two alternative views of the relationship between flows and exchange rate dynamics. First, a 'weak flow-centric view' in which flows contain information about deviations from fundamental values rather than about fundamentals per se, and therefore have only temporary price effects; short-term positive autocorrelation with long-term negative autocorrelation. These effects may include liquidity and

transaction demand price pressures, preference and other demand shocks. This view is aligned with behavioral models of equity price behavior discussed previously.

A third explanation of the contemporaneous positive correlation between flows and returns may have nothing to do with flows having a direct causal link to returns. Flows may passively respond to fundamental information rather than reveal it. Hence, flows may contain no information about fundamentals or about deviations from fundamentals that are useful for forecasting prices. For example, flows may respond with a lag to news and have ability to predict future price changes. Froot and Ramadorai (2002) call this the 'fundamentals-only view'.[9]

Froot and Ramadorai (2002) find that currency flows are highly correlated with contemporaneous and lagged exchange rate changes; similar to findings from mutual fund flow/stock return studies, flows respond to returns. Flows convey information about future excess currency returns, but this information is not strongly related to future fundamentals. Flows are important in understanding transitory elements of excess returns, which includes short-run underreaction and long-run overreaction. Flows have zero correlation with permanent components of excess returns. Hence, flows have only a transitory effect on prices. Measured fundamentals – not flows – seem important in understanding permanent elements of excess returns. They conclude that investor flows are important for understanding deviations of exchange rates from fundamentals but not for understanding long-run currency values.

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[9] This view is identical to the notion that mutual fund flows and stock returns respond to same economic factors/news without implying a direct causal link between them.

Froot and Ramadorai's (2002) results almost match perfectly with the conclusion in Gemmill and Thomas (2003) in their study of closed-ends funds, namely that fluctuations in the discount to NAV over time are strongly-influenced by small investor sentiment while rational fundamental forces (arbitrage costs, expenses) drive the long-run level of the discount across funds. They also relates nicely to Cliff and Brown (2002) who find that sentiment indicators, including flows, are positively related to deviations from fundamental value, and the Gemmill and Thomas CEF paper.

A common theme in the results of the mutual fund flow and sentiment based deviations from fundamental is that the alternative views of the dynamic link between flows and asset values may be valid at different times – that is, there are different regimes in which the link between flows and returns differs in a fundamental/structural way.

Summary and Implications

This paper was motivated by the intense interest on the part of many real estate market participants in monitoring capital flows into real estate. This is viewed as a productive activity in part due to the perceived link between capital flows and property values or maybe more appropriately capital flows and deviations in price from fundamental value, given that there is little doubt that excessive mortgage debt flows fuelled the property price and development boom of the 1980s. The question that needs to be addressed is whether there is a systematic causal link between capital flows and real estate values that can be exploited in making real estate acquisition/disposition and lending decisions. Does monitoring of capital flows tell us anything we do not already know given that we have information on macro economic variables, space market fundamentals, property valuations, cap rates, and returns to other asset classes?

Direct testing of the incremental impact of capital flows on direct real estate is difficult. Real estate markets are localized and transactions relatively private. Hence, there is not a single market per se and asset values are noisy and discontinuous. Hence, the approach taken here was to review the literature on the link between flows and asset values in stock and foreign exchange markets, for which better quality and higher frequency data is available, largely because these assets trade in relatively frictionless national venues.

Historically, from an academic viewpoint, fund flows were not considered relevant factor in asset valuation. According to the efficient markets hypothesis (EMH) any deviations of price from fundamental value is quickly arbitraged away; the price is always right. Recent work has begun to seriously study the limits of arbitrage including the transaction costs associated with implementing arbitrage trades to keep price at fundamental value. Much progress has been made in linking limits to arbitrage in a world of heterogeneous investors to stock price "bubbles" or episodes in which the trades of uninformed or irrational investors push stock prices too high, at least at a conceptual level.

If relatively small frictions in the stock market, as compared to transaction costs, noise and liquidity in the private real estate market, can cause periods of overvaluation then it seems reasonable to assume that the real estate market is even more susceptible to such episodes. Hence, this review surveys key papers that aim to empirically document the link between uninformed demand and asset prices in financial asset and foreign exchange markets.

Collectively, the papers reviewed do appear to provide significant evidence that at most times there is not a direct causal link between flows and returns (or asset values). That is, while capital flows and asset values are positively correlated, neither is directly causing the other; they simply respond

to the same fundamental economic news and provide a barometer of market liquidity. However, it does appear that in certain episodes of "extreme" environments capital flows are related to mispricing of assets that is related to the interaction of uninformed traders and limited arbitrage. Hence, tracking capital flows is a fruitful exercise in more volatile periods.

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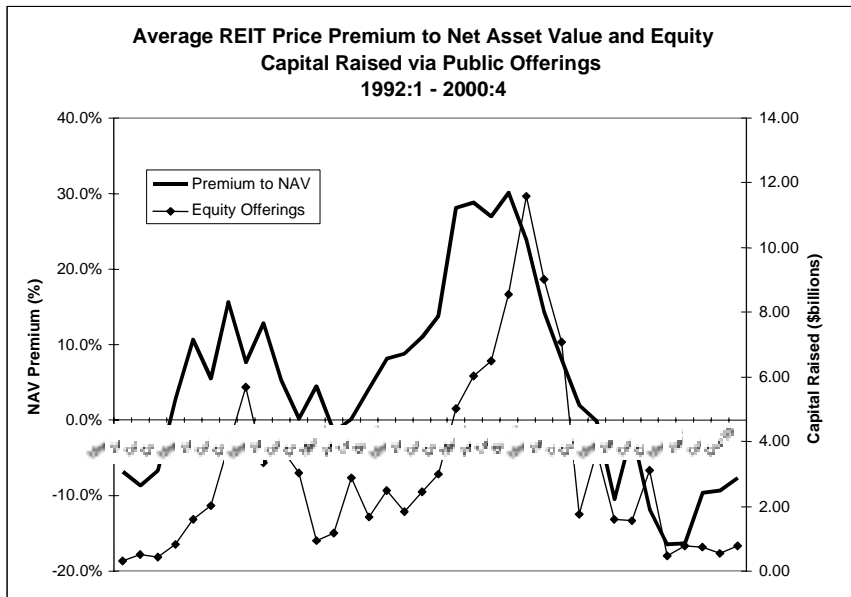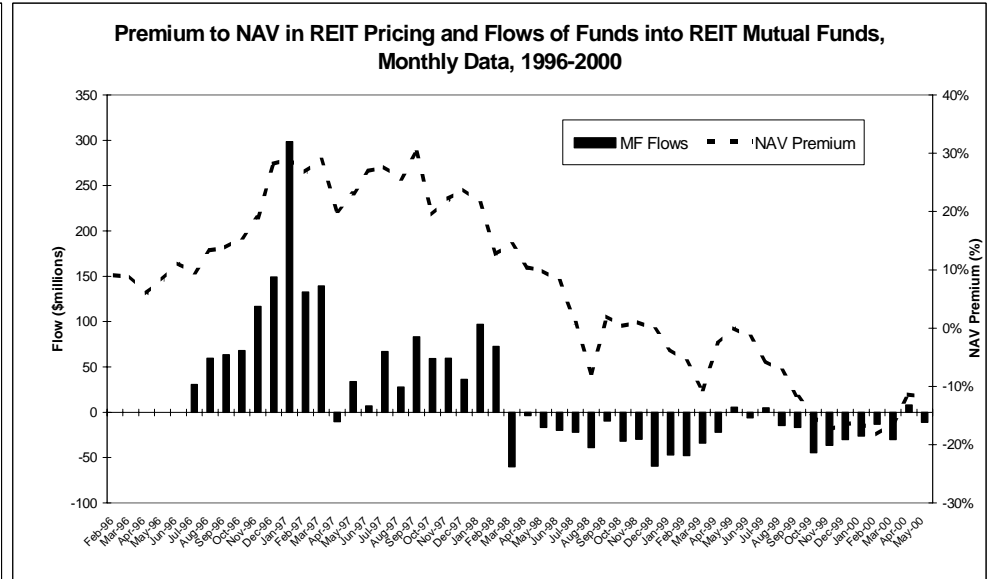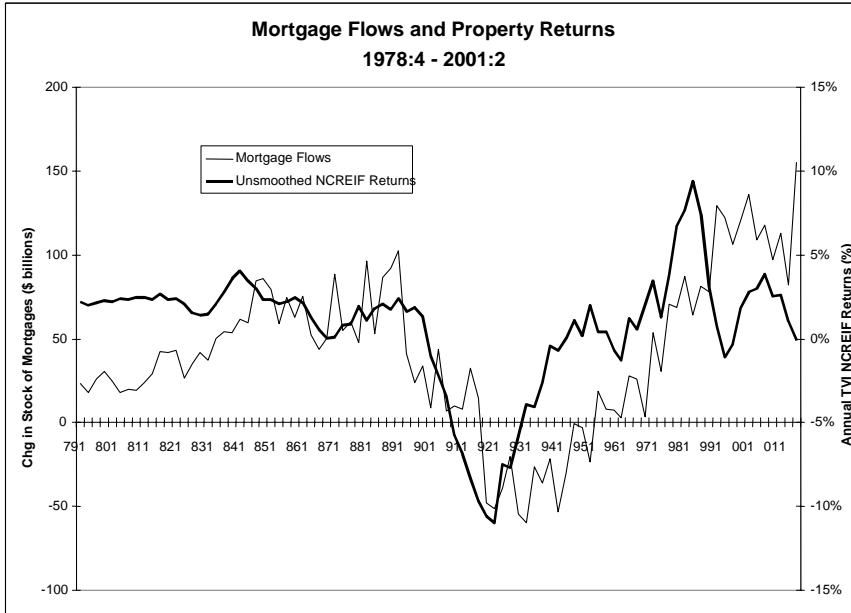Giliberto, M. (1993) "A Note on Commercial Mortgage Flows and Construction," *Journal of Real Estate Research.*

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Capital Flows and Real Estate Values: Private Market (Values vs. Mortgage Flows) & Public Market (Values vs Equity Flows)

Mortgage Flows and Property Returns
1978:4 - 2001:2

Premium to NAV in REIT Pricing and Flows of Funds into REIT Mutual Funds,
Monthly Data, 1996-2000

Average REIT Price Premium to Net Asset Value and Equity
Capital Raised via Public Offerings
1992:1 - 2000:4

Sources: Based on data obtained from Green Street Advisors, NAREIT, The Federal Reserve Board, Salomon Smith Barney and NCREIF.

Table 1. Studies of the Link Between Fund Flows and Stock Returns

Authors:	Title/Source:	Aim/Motivation:	Time Period/Data:	Method/Approach:	Main Findings:
Warther	"Aggregate Mutual Fund Flows and Security Returns," *Journal of Financial Economics*, 1995 & "Has the Rise of Mutual Funds Increased Market Instability?" *Brookings-Wharton Papers on Financial Services*, The Brookings Institution, 1998.	Growth in mutual funds has led to popular press claims that fund flows drive aggregate stock valuations and add to stock market volatility. [Price pressure hypothesis] Empirical analysis seeks to answer two questions: (1) Do security returns affect mutual fund flows? (2) Do mutual fund flows affect security returns? Alternative is that flows and returns not causally linked but both respond to common info.	Net aggregate U.S. equity MF flows. Monthly ICI data over 1984 to 1996 period. Note: Brookings paper updates by two years the original JFE study.	-Time series model of MF flows used to assess persistence and partition flows into expected and unexpected components -Examine relationship between flows (unexpected) and returns, first concurrently and then lead, lag relationships.	-High persistence in flows [AR(3) model] -Strong contemporaneous relation between flows and returns. -No positive relation is found between returns and subsequent flows and no relation is found between flows and subsequent returns. -Rejects both sides of a feedback trading model arguing that security returns neither lead nor lag MF flows.
Remolona, Kleiman & Gruenstein	"Market Returns and Mutual Fund Flows," *FRBNY Economic Policy Review,* 1997			-extend Warther ('95) single equation approach to a vector autoregressive (VAR) system that incorporates returns on other assets classes as determinants of flows into stock funds.	-essentially same findings as Warther
Edwards & Zhang	"Mutual Funds and Stock and Bond Market Stability," *Journal of Financial Services Research*, 1998	Financial press/analysts point to growth in equity MFs as driving force behind runup in stock prices. PRICE PRESSURE story as more individual investors chase a relatively fixed supply of corporate equity. MF flows widely scrutinized as a measure of investor sentiment. But is it evidence	Monthly U.S. equity mutual fund flows from Jan. 1961 to February 1996. ICI data.	Empirically examine link in, and search for causality between, flows and returns in two ways: -Granger causality (lead, lag) tests with only returns and flows: -Structural 2 equation econometric model of flows and returns with macro factors. Use of macro factors purges both MF flows and	Granger causality tests: -MF flows respond to (lag) returns but overall flows do not affect future returns, though there is some evidence they do in down markets. Structural Model: - no evidence to support the notion that fund flows affect returns, but consistent with

		of irrationality, or perfectly consistent with efficient markets? Documented correlation between MF flows and returns not sufficient to infer causality.		stock returns of common drivers.	GC tests and earlier work there is strong evidence to suggest that returns cause flows.
Fortune	"Mutual Funds, Part II: Fund Flows and Security Returns," *New England Economic Review*, Federal Reserve Bank of Boston, 1998	Extend work of Warther ('95) & Remelona, Kleiman and Gruenstein ('97). Is there a feedback relationship between fund flows and stock prices, a prerequisite to flows being destabilizing? Argues that Warther's results are biased towards finding no effect of past returns on current fund flows in the presence of a positive contemporaneous correlation.	ICI monthly mutual fund flows. January 1984 to December 1996.	Unrestricted vector VAR and multivariate "block" Granger Causality tests. VAR includes returns on several different securities as predictors of mutual fund flows, so the hypothesis tests are tests of the effect of relative rates of returns on flows.	Returns affect subsequent flows - strong support for the notion that realized security returns affect subsequent mutual fund purchases – in stark contrast to earlier work (except for Edwards & Zhang '98 above) that finds that flows do not appear to be affected by past security returns.
Cha & Lee	"The Market Demand Curve for Common Stocks: Evidence from Equity Mutual Fund Flows," *Journal of Financial and Quantitative Analysis,* 2001	Seeks to determine if the aggregate demand for stocks, as proxied by the flow of funds into equity mutual funds, directly influences stock prices. That is, tests to see if aggregate demand curve is downward sloping.	ICI monthly mutual fund flows. January 1984 to December 1999.	Use two empirical approaches to distinguish between the price pressure and information effect theories. (1) Present value model of stock prices with time-varying expected returns. Estimate impact of fund flows on stock prices (price pressure) without being justified by effect on subsequent cash flows or changes in expected returns. (2) Test for impact of mutual fund flows on stock returns in the presence of other market fundamentals, using Granger Causality (lead-lags) and Cointegration (allows for contemporaneous relationship	PV model results: price pressure effect is very small and insignificant. Equity flows seem to affect market returns through revisions in expected future cash flows and expected future returns. Multivariate Granger Causality tests: flows do not affect stock market returns directly in the presence of market fundamentals, though equity returns do Granger cause equity flows. Cointegration results: some evidence of equity flows to prices mainly through the

				and feedback between flows and prices).	feedback term so there appears to be a feedback relation between the levels of equity fund flows and market index prices.
Karceski	Returns-Chasing Behavior, Mutual Funds and Beta's Death forthcoming in the *Journal of Financial and Quantitative Analysis*	Develops a model of the behavior of active MF managers that relies on the assumption that MF investors chase returns. Needs to verify this. Empirical analysis can be viewed as an extension or improvement of analysis in Warther ('95,'98)	Net MF (cash) flows. Monthly ICI with 5 categories of equity funds by objective [same as Warther ('95)] Jan. 1984 – Sept. 1996	-Regression analysis of link between MF flows, both actual and unexpected, and current and past market returns. -Extends Warther by using cumulative lagged returns over 12 months as well as volatility as explanatory variables.	-Aggregate unexpected equity MF flows are positively related to concurrent and lagged market returns. -Unexpected components dissipate over time (AR process) -MF flows more sensitive to market returns in bull markets
Edelen & Warner	"Aggregate Price Effects of Institutional Trading: A Study of Mutual Fund Flow and Market Returns," *Journal of Financial Economics,* 2001	Study relation between stock market returns and aggregate U.S. equity mutual fund flows using *daily* data. Argue that high frequency daily data is better suited to address return/flow dynamics than monthly data employed in previous studies.	Net $ daily inflow into 424 U.S. equity mutual funds from February 2, 1998 through June 30, 1999.	-As in Warther ('95) examine relationship between flows (unexpected) and returns, first concurrently and then lead, lag relationships.	Positive correlation between aggregate (unexpected) flows and concurrent (excess) market returns. Flows respond to returns, or info driving returns, with a 1 day lag.
Gompers & Lerner	Money Chasing Deals? The Impact of Fund Inflows on Private Equity Valuations, *Journal of Financial Economics,* 2000.	Examine, and explore causes of, the relationship between flow of $ into venture capital funds and the valuation of new investments (firms) financed by the VC funds. ***What is the causal link between fund flows and private equity values?*** Does too much money chasing too few "deals," drive up the value of investments financed by these funds? [*Exogenous shift in demand / sentiment or demand pressure explanation*]	A proprietary database, VentureOne, that tracks ven-cap financing, 1987-1995.	Test to see if values of venture capital investments are positively related to venture capital fund inflows, after controlling for other factors that should impact values, both firm-specific and industry wide. Employ a hedonic pricing model to value venture capital investments (firms financed by venture capital funds) as a function of: age, stage of development, industry, public	Find a strong positive relationship between the private equity value of venture capital investments (firms) and inflows into venture capital funds, after controlling for other factors. The impact of fund flows is most pronounced in periods with larger ven-cap activity and the prob of refinancing is positively related to level of venture capital fund inflows.

		Or, do flows result from expectations of strong future performance not past performance, and hence flows do not cause investments but respond to prospects. [*Rational* contemporaneous link between flows and valuations]	market valuation of firms in same industry (industry group valuations, industry book to market, industry earnings to price ratio) Undertake a significant number of robustness checks (alternative model specifications) to gain confidence in the results.	These findings are consistent with the demand pressure/sentiment explanation of the link between fund flows and valuations.
Froot & Ramadorai	"The Information Content of International Portfolio Flows," NBER Working Paper 8472, 2001			
Froot, O'Connel & Seasholes	"The Portfolio Flows of International Investors," *Journal of Financial Economics*, 2001			
Wermers	"Mutual Fund Herding and the Impact on Stock Prices," *Journal of Finance*, 1999			
Nofsinger & Sias	"Herding and Feedback Trading by Institutional and Individual Investors," *The Journal of Finance*, December, 1999			

MF = mutual fund
ICI = Investment Company Institute, a trade association for the mutual fund industry.

Table 2. Studies of the Link Between Order/Investor Flows and Exchange Rate Dynamics

Authors:	Title/Source:	Aim/Motivation:	Time Period/Data:	Method/Approach:	Main Findings:
Evans & Lyons	"Order Flow and Exchange Rate Dynamics," *Journal of Political Economy*, 2002	Failure of traditional macro fundamental-based models to explain exchange rate (e-rate) dynamics has long been recognized as a major problem in the international finance literature. Present a model that augments macro analysis with a key microstructure consideration - order flow - flow is important because it is essential to the transmission of information to price.	*Daily* order flow. All deutsche mark/dollar and yen/dollar transactions that took place from May 1 to August 31, 1996 on the Reuters Dealing interdealer tading system.	Model daily e-rate dynamics combining traditional macro approach (monthly) & transaction frequency model (trade by trade). Null is that causation runs from order flow to price, with flow serving as the means by which nonpublic information is learned and incorporated in price. Order flow is "signed" transaction volume = the sum of signed buyer initiated and seller initiated orders over time.	*Cumulative* order flow and nominal exchange rates are strongly positively autocorrelated, indicating the price increases with buying pressure, at daily frequency. Contemporaneous order flow dramatically increases the ability to explain e-rate dynamics. E-rates are strongly and positively related to order flow, or more precisely the information order flow conveys.
Lyons	Notes on Microstructure/Order Flow Approach to Modeling Exchange Rate Dynamics. http://faculty.haas.berkeley.edu/lyons/	Does the strong contemporaneous link between order flow and e-rates derive solely from the information effect (i.e. flow and trading reveal information)? Or, alternatively does flow respond to excess returns in which case they are destabilizing rather than transmitting fundamentals into price?	Same daily interdealer order data as above paper.	Uses cointegration and error correction models (ECMs) to investigate the dynamics of the link between changes in e-rates and order flow. Relates changes in e-rates and order flow to change in the and an error-correction term that measures deviations from fundamental value.	No evidence of feedback trading – causality is running strictly from order flow to price (e-rate). The error correction term is highly significant in the e-rate equation, but insignificant in the order-flow equation. This implies that adjustment to LR equilibrium is occurring through the e-rate. Order flow is weakly exogenous.
Froot & Ramadorai	"Currency Returns, Institutional Investor Flows and Exchange Rate Dynamics," NBER Working Paper 9101, 2002	Extend Evans and Lyons (2002). Place their model within a larger set of views. Importantly covers a much longer time span and examines the potential for flows to be related to short-run	Cross-border foreign exchange (FX) data from State Street Corporation for 19 currencies. More than 6 million transactions	Study time series properties and links between flows and e-rate returns over both daily and monthly frequencies. Look at both short-horizon and long-	Currency flows are highly correlated with contemporaneous and lagged exchange rate changes – flows respond to returns.

	overvaluation in asset markets (i.e. related to deviations from fundamental value). Aim to assess the three potential avenues through which investor flows impact asset prices and returns: 1. Flows represent info incorporation ala Evans and Lyons – investor flows have permanent impacts on e-rates; 2. Flows represent info about deviations from fundamental values rather than fundamentals (price pressure); 3. Flows contain no info about fundamentals or deviations from fundamental value (there is no causal link) but simply respond to it.	from January 1, 1994 to Feb. 9, 2001.	horizon statistics to infer permanent and transitory effects of link between flows and returns. Formally model dynamic link between flows, returns and fundamentals within a VAR framework that allows excess returns to be broken down into permanent and temporary effects.	Flows convey info about future excess currency returns, but this info is not strongly related to future fundamentals. Flows are uncorrelated with permanent components of excess returns, but are related to transitory elements of excess returns = short-run underreaction and long-run overreaction. Conclusion: Investor flows are important for understanding deviations of exchange rates from fundamentals but not for understanding long-run currency values.
Jeanne & Rose	"Noise Trading and Exchange Rate Regimes," *Quarterly Journal of Economics*, 2002			

Table 3. Studies of the Link Between Trading Activity, Liquidity and Stock Returns

Authors:	Title/Source:	Aim/Motivation:	Time Period/Data:	Method/Approach:	Main Findings:
Chordia, Roll & Subrahmanyam	"Market Liquidity and Trading Activity," *Journal of Finance*, 2001.				
Baker & Stein	"Market Liquidity as a Sentiment Indicator," Harvard Working Paper, October 2001. NBER WP 8816, March 2002.	Recent papers document significant time variation in aggregate stock market liquidity (both friction/spread and trading activity (volume, turnover) measures; liquidity increases (spreads decrease and turnover increases) in bull markets and decreases quite dramatically in down markets <u>and</u> high liquidity predicts lower future stock returns. Why does liquidity fluctuate over time? Our understanding of cross section al differences in liquidity is pretty good, but it is difficult to explain intertemporal changes in aggregate liquidity in terms of existing models.	Primarily a theoretical contribution though some empirical evidence is provided. Annual data on NYSE turnover, equity issuance, and returns (CRSP) over the 1927-1998 period.	Develop a model that links time variation in liquidity to trading by irrational investors (those subject to waves of sentiment) in a world of short-sale (SS) constraints and limited arbitrage. SS constraints inhibit the ability of rational investors to eliminate mispricing and imply that irrational investors are only active in the market when they are overly optimistic. On the upside asset values reflect the sentiment of these irrational traders. When they are too pessimistic they cannot act by shorting and are forced to the sidelines.	Investor sentiment is directly linked to trading (turnover) and liquidity. Measures of liquidity acts as an indicator of the relative presence (or absence) of sentiment-based traders in the market place and therefore the divergence of asset price from fundamental value. Empirical analysis shows that turnover has significant predicative ability for future stock returns after controlling for other factors. In fact both turnover and equity issuance have incremental explanatory power.
Gervais, Kaniel & Mingelgrin	"The High Volume Return Premium," *Journal of Finance*, 2001.	What is the power of trading activity to predict the direction of future stock price movements (returns)? Does trading volume convey information about future prices? EMH predicts that volume should	NYSE returns and volumes from CRSP, 1963-1998. Daily and weekly samples.	Study how the trading activity of an *individual* stock is related to the future price evolution of that stock. Suggest that trading activity (volume) shocks affect a stocks visibility, and	Periods of unusually high (low) trading volume tend to be followed by positive (negative) excess returns. Result holds across all stock sizes and cannot be

		not have any predictive power.	therefore subsequent demand and price. In contrast to EMH. Hypothesize that in a world with constraints on short-selling, pessimistic traders will be on the sidelines and their opinions will not be incorporated into stock prices.	explained as a liquidity premium in terms of bid-ask spreads. Hence, provide a link between a liquidity proxy (volume or trading activity) and price that is not directly a liquidity phenomenon in the conventional sense, much in the spirit of Baker and Stein (2002).
Lee & Ready	"Price Momentum and Trading Volume," *Journal of Finance*, 2000.		
Chordia, Roll & Subrahmanyam	"Market Liquidity and Trading Activity," *Journal of Finance*, 2001.		

Table 4. Studies Directly Relating Investor Sentiment Proxies to Asset (Stock and Closed-End Fund) Pricing

Authors:	Title/Source:	Aim/Motivation:	Time Period/Data:	Method/Approach:	Main Findings:
Gemmill & Thomas	"Noise-Trading, Costly Arbitrage and Asset Prices: Evidence from Closed-End Funds," forthcoming *Journal of Finance*	Test the noise trader model of DSSW (1991) and specifically the following proposition: if arbitrage is costly and noise-traders are active in the market, asset prices may deviate from fundamental values for long-periods. Argue that closed-end funds provide a good laboratory.	Monthly data for 158 UK traded closed end funds over the 1992-1998 period. Grouped according to sector. Also have net flows of funds into and out of open-ended mutual funds (so called retail investor flows) in the equivalent sectors.	Hypothesize that fluctuations in the CEF discount over time are driven by money flows derived from trading by irrational investors (i.e. by market sentiment). Further hypothesize that fluctuations in CEF discounts and retail flows are jointly determined. Cointegration and vector error correction (VECM) modeling of link and feedback between flows and discount.	Cointegration analysis indicates a strong link between CEF discounts and retail flows. Conclude that noise-trader sentiment, as proxied by retail investor flows into similar open-ended mutual funds, leads to fluctuations in the discount. That is, changes in the discount are a function of time-varying noise trader demand, as proxied by retail investor flows.
Brown & Cliff	"Sentiment and the Stock Market," UNC Chapel Hill Working Paper, 2000				
Goetzman, Mass & Rouwenhorst	"Behavioral Factors in Mutual Fund Flows," Yale ICF Working Paper 00-14, March 2000				