

# What Does Equity Sector Orderflow Tell Us about the Economy?

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This version: June 2008

## Abstract

Investors rebalance their portfolios as their views about expected returns and risk change. We use empirical measures of portfolio rebalancing to back out investors' views, specifically views about the state of the economy. We show that aggregate portfolio rebalancing across equity sectors is consistent with sector rotation, an investment strategy that exploits perceived differences in the relative performance of sectors at different stages of the business cycle. The empirical foot-print of sector rotation has predictive power for the evolution of the economy, future stock market returns, and future bond market returns, even after controlling for relative sector returns. Contrary to many theories of price formation, trading activity therefore contains information that is not entirely revealed by resulting relative price changes.

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## **1. Introduction**

Asset prices reflect investors' views about economic fundamentals, and it is well understood that orderflow is the mechanism by which these views are aggregated. Empirical studies documenting the role of orderflow in price formation include Glosten and Milgrom (1985) and Hasbrouck (1991) for equities, Evans and Lyons (2002) for foreign exchange, and Brandt and Kavajecz (2004) for fixed income. There exists a rich literature documenting that asset prices help forecast economic fundamentals (see Stock and Watson (2003) for a survey of this literature in a macroeconomic context), but the predictive role of orderflow by itself and in conjunction with asset prices has not been explored fully. One possibility is that, since orderflow is only one component of the price formation process (public information resulting in instantaneous price adjustments being another), prices contain the same or potentially more information. Alternatively, however, investors' trading behavior may contain information that is not fully spanned by asset prices. The aim of our paper is to empirically investigate this issue.

We focus on investors' views about macroeconomic fundamentals (i.e., the stage of the business cycle), rather than firm-level information. There are many ways in which investors may rebalance their portfolios as their views about fundamentals are updated – e.g., change their stock/bond/cash allocation, change their positions in real assets such as gold or inflation-indexed Treasury securities, or change their relative equity allocation to different sectors of the economy. We focus on the last case of sector rotation, an investment strategy that exploits perceived differences in the relative performance of sectors at different stages of the business cycle. While we acknowledge that this may not be the most informative signal about investors' economic views, it does allow us to study orderflow within a single dataset (TAQ) as opposed to multiple

data sets covering different trading platforms with different representation of their respective markets.

We analyze the dynamics of orderflow across ten U.S. equity sectors to investigate whether systematic portfolio rebalancing is related to the current and future state of the macro economy. If orderflow reveals information about the economy, which we find it does, it may contain information about both future aggregate expected cash flows and future discount rates, which in turn should also be important for predicting returns in the stock and bond markets. Thus, we also investigate whether the level and nature of the information contained in sector orderflow is able to predict stock and bond market returns.

Our results show that sector orderflow movements are inconsistent with naive portfolio rebalancing techniques, such as buy-and-hold (no rebalancing) or a constant-mix strategy. Instead, it appears that market participants shift funds between equity sectors according to their collective information about the macro economy. Specifically, we demonstrate that equity sector orderflow predicts the state of the macro economy up to three months ahead. Consistent with economic intuition, large-sized unexpected orderflow into the material sector forecasts an expanding economy, while large-sized unexpected orderflow into consumer discretionary, financials, and telecommunications forecasts a contracting economy.

We also find that the cross-section of orderflow across sectors contains information that predicts the evolution of both stock and bond markets, even after controlling for returns. While it is interesting that orderflow predicts the macro economy, stock market and bond market, what is most intriguing is that the linear combination of sector flows that *best* predicts the macro economy contains the bulk of explanatory power for predicting the stock and bond markets. This

shows that the three phenomena we uncover – predictability of the macro economy, of stock returns, and of bond returns – are closely related.

As a capstone to our analysis we try to understand better the nature of the information contained in sector-level orderflow. First, we confirm the link between sector orderflow and macroeconomic information by highlighting the link to one of the most prominent macroeconomic releases, the non-farm payroll figures. Second, we show that the information in sector flows has more to do with sector allocation than stock picking as our results become significantly stronger after conditioning on low dispersion of orderflow *within* sectors. Finally, through the construction of an orderflow mimicking portfolio, whereby a well-diversified portfolio is ‘tilted’ according to sector orderflow movements, we are able to show that the information contained in unexpected orderflow is asymmetric. Specifically, the resulting portfolio is defensive and focused primarily on wealth preservation, despite the fact that it enjoys superior risk and return properties relative to the traditional market portfolio.

Section 2 discusses the related literature. Section 3 describes our data and methodology. Section 4 reports our empirical results. Section 5 examines the nature of orderflow information and Section 6 concludes.

## **2. Related literature**

The role of orderflow in a trading environment has received a fair amount of attention in the recent finance literature. Despite the growing number of papers that analyze orderflow, each can be partitioned into two broad strands of the literature based on their research focus. One strand of the literature takes a macro view of orderflow, by investigating how aggregate orderflow is related to market-level variables. Chordia, Roll and Subraymanyam (2000, 2001, and 2002) analyze the connection between orderflow movements into and out of equities and

market-wide liquidity while Evans and Lyons (2007) relate proprietary foreign exchange flows with output/money growth and inflation. Lo and Wang (2000) and Cremers and Mei (2007) investigate the implications of two-fund separation on aggregate share turnover, while Hasbrouck and Seppi (2001) study the relation between the common statistical factors within aggregate orderflow, liquidity and returns. Finally, Bansal, Fang, and Yaron (2005) demonstrate that there appears to be no relation between macroeconomic sectoral wealth and the return and volatility of sectoral returns.

The other strand of the orderflow literature takes a micro view, by investigating whether disaggregated orderflow can be used to forecast subsequent asset returns. In particular, Froot and Teo (2008) analyze institutional orderflow from State Street Global Advisors to investigate whether orderflow movements are related to mutual fund style returns. They find that flows appear to be related to styles and sector rotation is a specific investment style that they were able to identify. Campbell, Ramadorai and Schwartz (2008) also investigate institutional orderflow; however, their data source is a match of the TAQ database with the 13-F institutional ownership filings. Both studies find that institutional orderflow has a significant effect on subsequent asset returns.

Our paper is positioned between these two strands of the orderflow literature. The focus of our orderflow analysis is distinct in that we investigate the extent to which the dynamics of orderflow between sectors is related to the macro economy as well as broad markets rather than less aggregate series related to liquidity, volatility or specific mutual fund returns.<sup>1</sup> Our aim is to understand whether trading activity contains information that is not entirely captured by resulting relative price changes. Thus, our contribution to the literature rests importantly in the paper's

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<sup>1</sup> Another example of forecasting less aggregate series is Albuquerque et al. (2008). They find that a proxy for market wide private information obtained from equity market data forecasts industry stock returns.

focus being on the connection between market participants' decisions about sector orderflow and the larger macro economy.

### **3. Data and variable construction**

At the center of our empirical analysis are equity orderflow data constructed using the Trades and Quotes (TAQ) dataset over the sample period 1993 through 2005. Our universe of common stock equities is generated from the stocks covered in the *CRSP* dataset.

We construct our orderflow data through a number of steps. For each stock and each day in the sample period, we apply the following procedure. First, to ensure data integrity, we eliminate non-positive spreads, depths and trade prices as well as records where the size of the quoted spread and/or effective spreads are large relative to the median quoted for that specific stock. Second, we match the sequence of outstanding quotes with the sequence of trades applying the standard 5-second rule. Third, we aggregate all trades that are executed at the same price which do not have an intervening quote change. Fourth, we utilize the Lee and Ready (1991) algorithm to sign each trade as being initiated by a buyer or a seller. Lastly, each trade is assigned to a size category (small, medium or large) for orderflow specified in shares or in dollars. The shares cutoffs are small (<1,000 shares), medium (1,000 to 10,000 shares) and large (>10,000 shares), whereas the cutoffs for dollar orderflow are small (< \$25,000), medium (\$25,000 to \$250,000) and large (>\$250,000). This procedure results in a set of daily orderflow series for each security: small, medium and large buys and small, medium and large sells.

We assign each stock to one of the ten sectors defined by the Global Industry Classification Standard (GICS) developed by Morgan Stanley Capital International (MSCI) and Standard & Poor's (see the appendix for specific sector descriptions, abbreviations and corresponding numbers). We then construct sector-level net orderflow by simply summing all

orderflow for the individual stocks included in each sector. Likewise, we define sector level capitalization as the sum of the capitalizations (shares outstanding multiplied by end of month price) of the individual stocks in the sector.

The net orderflow to the stock market as a whole is the sum of net orderflow of each sector. We can thus define a measure of the *expected* net orderflow for a given sector as the total net orderflow to the stock market multiplied by the weight of that sector in the market portfolio. Effectively, the definition of expected net orderflow amounts to the null hypothesis that orderflow to the stock market is distributed across sectors by their weight in the market portfolio. In our empirical specification, we will then use measures of *unexpected* net orderflow for each sector, defined as the difference between sector-level total and expected net orderflow.<sup>2</sup>

Table 1 displays our total aggregate orderflow by sector and year expressed as a percentage of the total net orderflow for the year. While the percentage of orderflow across years remains fairly stable, there are some extreme percentages during the economic downturn in 1999 and 2000. Materials and consumer staples have low fractions of orderflow while health care, information technology and telecommunications have high fractions of overall orderflow. In addition, these shifts in the shares of orderflow across sectors appear more pronounced for large orders (Panel B) relative to all orders (Panel A), suggesting that market participants placing large orders may be more active and/or savvy in positioning their portfolio ahead of changes in the economy.

We supplement the equity sector orderflow with information about the current state of the economy, stock and bond market performance (returns) as well as non-farm payroll expectations

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<sup>2</sup> To be precise we acknowledge that each trade has both a buyer and a seller and our orderflow variables are constructed to measure whether buyers or sellers are initiating more trades, or equivalently, which side of the market is demanding more immediacy/liquidity.

and announcement information. We measure the state of the economy using the Chicago Federal Reserve Bank National Activity Index (CFNAI). The CFNAI index is a weighted average of a number of monthly indicators of economic activity first developed by Stock and Watson (1999).<sup>3</sup> Unlike the NBER expansion and recession periods, the CFNAI index has the advantage of being a coincident indicator, a measure of economic conditions available in real time. Figure 1 displays the 3-month moving average of the CFNAI index over our sample period. Note that an index value above (below) zero indicates economic growth above (below) the trend. Our sample covers a relatively balanced period of economic growth and decline, with the former occurring in 58% of the months in our analysis. The performance of the stock and bond markets are measured using the returns of the S&P500 index and the returns of the Fama-Bliss CRSP discount bonds. Finally, for the non-farm Payroll announcement we obtain the release dates, actual reported (announced) values and median forecasts from Money Market Services.

## **4. The Information in Equity Sector Orderflow**

### **4.1 Preliminaries**

As we have argued above, aggregate orderflow is a collection of all market participants trading strategies and therefore embeds their preferences, expectations, and information. Consequently, if we are interested in the information component of orderflow as it relates to the macro economy it is important to disentangle, or control for, any systematic portion of aggregate orderflow.

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<sup>3</sup> The CFNAI index is constructed to be a single summary measure (with mean zero and standard deviation of one) of the activity in four broad categories of the economy: production and income; employment, personal consumption which includes housing; and sales, orders, and inventories. For more detailed information concerning the CFNAI index see [http://www.chicagofed.org/economic\\_research\\_and\\_data/cfnai.cfm](http://www.chicagofed.org/economic_research_and_data/cfnai.cfm)

At the most fundamental level, equity market orderflow could simply be the result of movements into and out of the equity market as a whole. We investigate this possibility by conducting a principal component decomposition of sector orderflow. While our untabulated results reveal one dominant factor explaining 68% of orderflow movements; consistent with Hasbrouck and Seppi (2001), there are at least five other significant factors that are important in explaining orderflow. Given this result, we can quickly dispel the notion that aggregate equity orderflow simply blankets the equity sectors uniformly.

Portfolio rebalancing of sector positions is another common motive for trade. If market participants engage in a buy-and-hold strategy (effectively do not rebalance their portfolios), we would expect to see no relation between aggregate sector orderflow and the previous performance of the sector, while a negative relation between sector orderflow and previous performance would be consistent with a constant mix strategy. To investigate these possibilities, we analyze the temporal relation between sector orderflow and the corresponding lagged sector returns at both a weekly and monthly frequency. We suspect that the monthly aggregation may be more appropriate as it is better able to cancel out components that are related to liquidity and inventory, yet retain the components of orderflow that are related to long-lived information.

Our results for the weekly horizon (shown in Table 2, panel A) reject both the buy-and-hold and defensive rebalancing strategy (constant mix) as market participants appear extremely eager to increase the weight of a sector after a period of positive performance (positive excess returns). One way of interpreting these results is that in aggregate, market participants chase performance (or act as momentum traders) at the industry level. When we repeat the same analysis using a monthly frequency (shown in Table 2, panel B), the results on small and large orders are no longer significant while the results for medium orders are less significant than at

the weekly horizon. At this lower frequency, orderflow simply does not appear to respond to previous excess returns. Thus, at the sector level, neither defensive rebalancing nor momentum trading seem to be a pervasive determinant of orderflow patterns over a full month.

These results show little evidence that in aggregate market participants defensively rebalance their portfolios. If anything, orderflow seems to respond positively to past sector returns, but only at a weekly frequency. These findings, combined with the evidence from the principal components analysis that there are many factors driving orderflow dynamics, suggest that orderflow is driven by more than simple indiscriminant or defensive trading strategies and therefore, has the potential to reveal aggregate investor information related to beliefs, expectations and risk preferences.

## **4.2 Sector Orderflow and the Economy**

In this section we explore whether the collective trades of market participants across asset classes contain information about the expected state of the macro economy. Our conjecture is that market participants are continually digesting news about the macro economy; as they process this news, it impacts their preferences, expectations and risk tolerances, which in turn induces them to trade.

Our analysis involves aggregating orderflow to the monthly frequency and testing whether sector orderflow has predictive power for the CFNAI expansion indicator. In particular, we construct a measure of unexpected orderflow, which we standardize by the market capitalization of each sector. This empirical specification has a number of advantages. First, this measure reflects the orderflow that is entering a sector in excess of new funds flowing into the stock market. Second, standardization by sector market capitalization enjoys the intuitive interpretation of market share and also avoids the practical difficulty of overweighting the largest

sectors. Lastly, we are careful to control for the current level of the expansion indicator to make sure that loadings on the flows do not pick up any contemporaneous relation with the economy.

At the outset, we investigate whether unexpected monthly flows, within each separate sector, have predictive power for the expansion index one and three months into the future. Our rationale for investigating each sector in isolation is to understand, in an unconditional and unconstrained environment, which sector orderflow series are most closely associated with economic expansions and contractions.

Our results in Table 3 show that flows into a number of the sectors forecast expansion/contractions in the macro economy, particularly for large orders. We find that unexpected flows of large orders into the material sector predict higher levels of the expansion index both one and three months ahead, while unexpected flows of large orders into financials, telecommunications and consumer discretionary predict lower levels of the expansion index at the one and three month horizons. Moreover, the coefficients are also economically significant; as an example, a one-standard deviation shock to large flows in the materials sector implies a 0.14 higher expansion index one month later, and such a move is approximately 10% of the maximum value of the expansion index within our sample.

While the relation between sector flows and the macro economy is quite compelling for the large orders, the forecasting power of the medium and small-sized orderflow is dramatically lower with only unexpected flows into utilities being consistently (negatively) associated with the expansion index. The contrast between the large and small/medium orderflow results is interesting because it suggests the information, expectations, preferences and risk tolerance of the market participants behind the different size trades is dramatically different. Under the simple assumption that large orders are more likely to originate from institutional investors while

small and medium orders are more likely to originate from retail investors, our results suggest that institutional investors are better able to position their trades in anticipation of changes in the economy than are retail investors. Retail investors appear to have a very coarse partition of the sectors with utilities showing up as the only defensive sector and no significant expansion sectors being employed.<sup>4</sup>

After investigating the relation between the expansion index and sector orderflow by individual industry, we now turn to an analysis of the cross-section of flows. Specifically, we are interested in determining the orderflow factor (i.e. the set of sector loadings) with the highest correlation to the state of the macro economy. Table 4 presents the correlation of each sector's unexpected orderflow with the linear combination of ten sector factor loadings that best predict the macro economy. Notice that, consistent with the individual sector results, the large flow results are different from the small and medium flow results.

Beginning with the three-month horizon, there appears to be some stratification of orderflow among sectors based on the size of the flow. For example, large flows show that materials, industrials, and consumer staples are aggressive economic sectors, while energy, consumer discretionary, financials, and telecommunications are all defensive sectors relative to the expansion/contraction index. The small and medium sized flows show a sharp contrast in their positioning. The materials and industrial sectors for the medium flows are aggressive (positive coefficients) as are the materials, consumer discretionary, information technology and telecommunication sectors for the small sized flows. Utilities are the one defensive sector for the small and medium flows. Fewer sectors have significant correlations at the one-month horizon, which suggests that one quarter ahead of an expansion (contraction) market participants perform

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<sup>4</sup> We acknowledge that with the increased importance of algorithmic trading recently, institutions can optimally break up their trades to minimize price impact and disguise their actions. Therefore, it might not be necessarily true that small trades correspond to retail investors trades.

a broad portfolio reallocation (three-month results), while the final adjustments before a turn in the economy appear to be concentrated into (out of) fewer sectors (one-month results).

At the one-month horizon, the materials sector is the most aggressive sector for large flows, while health care and information technology are the most aggressive for medium and small flows, respectively. Consumer discretionary, financials, and telecommunications are the defensive sectors for large sized flows, while utilities remains the one defensive sector for small and medium sized orderflow.

In summary, it is clear that the link between aggregate sector orderflow and the macro economy is strong, with large-sized unexpected orderflow in particular sectors able to forecast expansions/contractions up to one quarter ahead. In addition, large-sized sector orderflow, which is likely to originate from institutional investors, appears to contain the bulk of the predictive power in aggregate orderflow. Moreover, the target sectors in our results for trading on the macro economy are consistent with common financial wisdom concerning sector rotation and portfolio allocation tactics.

### **4.3 Sector Orderflow and Markets**

To the extent that financial markets are tied to economic expansions and contractions, it is an empirical question whether sector orderflow contains pertinent information about the performance of the equity and bond markets and how that information compares to the information that is useful for predicting the macro economy.

In this section we regress equity market returns on individual sector orderflow in order to understand whether market participants overweight/underweight sectors in anticipation of higher/lower future stock market returns. Table 5 presents our results. Clearly the predictive power for the equity market is much weaker than results for the macro economy. For example,

at the 1-month horizon, small sized flow into utilities as well as medium and large-sized flows into the telecommunication sector seems to predict lower future stock market returns. Moreover, the economic significance is striking in that a one-standard deviation shock to the telecommunication sector predicts a 1% monthly return. However interestingly, these results are not sustained at the 3-month horizon with weak and sporadic significance displayed among the sectors. We also compute the correlations between each sector's unexpected orderflow and the linear combination of ten sector factor loadings that best predict the stock market, similar to the analysis presented in Table 4 for the macroeconomy. We find that the most aggressive sector for large-sized flows is information technology and the most defensive is the telecommunication sector, consistent with the univariate results (results not reported).

We perform the same analysis on the bond market (1-year maturity), see Table 6. Not surprisingly, the results are stronger than the corresponding results for the equity market, which is consistent with the received wisdom that the macro economy and the fixed income market may have more in common with each other than either has in common with the equity market. For the medium and large sized flows, the materials sector has a negative sign and the financials and utilities sectors have a positive sign, which is exactly the opposite result found for the expansion indicator.<sup>5</sup> Furthermore, these results hold at both the 1 and 3-month horizons. As an example of the substantial economic impact of these results consider that a one standard deviation shock to flows into the material sector predicts a 0.0005 lower monthly bond return (0.6% lower annual return), which is about ten times the average one-year bond return in our sample. Moreover, the analysis of the correlations between each sector's unexpected orderflow and the linear combination of ten sector factor loadings that best predict the bond market,

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<sup>5</sup> Regressions were also run using the 3-year and 5-year bond returns. The results were similar and are available upon request.

confirms that the most aggressive sector for large-sized flows is materials and the most defensive is the financial sector (results not reported).

Since the cross-section of flows across sectors contains information about the future evolution of the economy, the bond market, and, to a lesser extent, the stock market, one could also envision that it contains information about future volatilities. Specifically, investors could re-allocate towards defensive sectors not only when they believe the economy is transitioning into a recession, but also when they think the risk of such an event is higher. We investigate this hypothesis using the same empirical specification adopted before to predict the economy, where we now replace the dependent variable with the logarithmic change in the volatility index (VIX) one-month and one-quarter ahead.<sup>6</sup> We find that flows have some predictive power, but this is not very substantial. For example, the unexpected flows across sectors predict up to 6% of the variation in the VIX change in one month (results not reported).

## **5. The Nature of Orderflow Information**

While the predictive power of sector orderflow has been clearly established, what remains is to better understand the exact nature of the information contained therein. To that end, a number of questions come to mind. Do prices/returns contain the same or potentially more or less information than flows? Can sector orderflow movements be directly tied to the release of important macroeconomic information? What is the relationship, if any, between the information in sector flows that predicts the macro economy, the equity market and the bond market? Is the information in flows economically relevant? The next subsections will address each of these questions in turn.

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<sup>6</sup> VIX is a model-free implied volatility of S&P500 options with one-month to maturity computed by the CBOE and is commonly used as a measure of global risk-appetite. We also experiment with a realized volatility measure obtained from S&P500 returns, obtaining very similar results.

## 5.1 Orderflow versus Returns

Others have investigated whether market level variables can be used to predict the economy. Specifically, our paper is related to Lamont (2001) and Hong et al. (2007), who show that the cross-section of *returns* across sectors predicts the economy and the stock market. Thus, when juxtaposing our orderflow results with results from the literature on returns, a natural question arises as to whether orderflow contains the same information as returns. On one hand, the two series are related through the interaction of the demand and supply of shares (orderflow) which generates the equilibrium price (returns) and quantity (volume); on the other hand, the two series are distinct as orderflow is an aggregation of market participant *actions* while returns are an aggregation of trading *consequences*. Nonetheless, it remains an empirical question whether orderflow, returns or both, contain information about the future of the economy and the various markets, as well as what the specific nature of the respective information sets may be.

To formalize this comparison, we predict the expansion indicator CFNAI with excess sector returns rather than orderflow, sector by sector. Table 7 displays our results for the large-sized orderflow. For comparison purposes, we also include the  $R^2$  from the orderflow results within Table 3. The  $R^2$  comparison reveals very little difference on average between the explanatory power of flows and the explanatory power of returns. Further inspection reveals however that the sector returns with predictive power are different than the sector flows. For example, within the return regression, consumer discretionary and staples, health care, financials and utilities are all negatively related to economic expansion, which suggests that a negative excess return in these sectors predicts an expansionary economy. In contrast, recall that the orderflow regression showed that flows into the materials sector and flows out of the financial and utility sectors are associated with an expanding economy.

To complement the above analysis, we run regressions on the economic expansion index, the stock market return and the bond market return varying the set of independent variables among the various orderflow and return series. Table 8 displays our results which compares the adjusted  $R^2$  across the various sets of predictors. Panels A, B and C correspond to the economic expansion index, the stock market and the bond market respectively. The first item to note is that the cross-section of flows contains more explanatory power than returns for future economic expansions. The difference is more striking at the three-month horizon and for large-sized flows; specifically, adding flows to the current level of the index generates a twofold increase in the explanatory power, while adding returns alone only increase the  $R^2$  by about 2%. For the stock market return, not only is there less predictability, it is not clear whether flows dominate returns. At the one month horizon, flows of large-sized orders dominate while at the three month horizon excess sector returns offer better predictability. Finally, like the results for the economic expansion, the large-sized flows dominate returns in predicting the one-year maturity bond returns, strikingly so at the three-month horizon. These results clearly demonstrate that orderflow encompasses more information than is contained in returns.

## **5.2 Orderflow and Macroeconomic News**

One potential concern is that our results could be driven by something other than our hypothesis that economic news alters market participants' fundamental views of, and attitude toward, economic fundamentals, which in turn induces trade. To address this concern we investigate whether sector orderflow responds directly to important macroeconomic announcements which we know are signals, albeit noisy, of the current state of the economy. Thus in the context of our analysis, the linear combination of sector orderflows that best predicts the economy should be related to the new information released on an important macroeconomic

announcement day.<sup>7</sup> A significant relation between aggregate sector orderflow and macroeconomic announcements would be consistent with our hypothesis and alleviate concerns that our results are driven by other latent factors.

For this test, our empirical design is to regress the orderflow factors with the highest correlation with the macro economy, stock market and bond market onto the standardized non-farm payroll announcement surprise, which is commonly known to be the first, and most influential, macro announcement within a given month (at least in our sample). We standardize the release by measuring the announced figure against the median expectation (the surprise) and dividing by the standard deviation of the surprise. Orderflow is measured over the week and the month following the non-farm payroll release. Panel A of Table 9 shows that both the orderflow factor for the macro economy and the bond market are significantly related to the non-farm payroll announcement while the orderflow factor for the stock market appears to have no relation. The positive sign on the expansion indicator regression suggests that the creation of new jobs (increase in non-farm payroll) predicts flows into those sectors which are associated with a macroeconomic expansion. The negative sign on the bond market is consistent with new jobs being associated with flows from the bond market into more risky assets, which in turn puts downward pressure on bond returns. Panel B replicates the above analysis using returns instead of flows as the dependent variable. In contrast to the flow results, the return factors are unrelated to the non-farm payroll release. This suggests that not only do returns carry less pertinent information relative to flows, the nature of the information within returns and flows appears to be different.

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<sup>7</sup> In this sense, our paper fits into the literature that uses the relation between macroeconomic announcements and asset prices to provide real-time estimates of the current state of the economy (e.g., Evans, 2005).

### 5.3 Relationship between Orderflow Information Predicting the Economy and Markets

To further investigate the exact nature of the information contained in orderflow, we consider whether the orderflow factors which have the maximal correlation with economic expansions, the stock market and the bond market has predictive power over the other dependent variables. For example, does the maximal linear combination of sector flows which best predicts economic expansions have any ability to predict the stock and bond market returns and vice versa? Specifically, Table 10 shows the explanatory power of regressing future values of the expansion indicator, the stock market return, and the bond market return on the current value of the dependent variable and a forecasting factor. The forecasting factor is a linear combination of either unexpected flows or excess sector returns, where the loadings are computed as those with the maximal correlation with each of the dependent variables, respectively.

Panels A, B and C of Table 10 display the results for the economic expansions, stock and bond markets respectively. Not surprisingly, the results show that own orderflow and own returns have predictive power across the three panels. Beyond this, Table 10 highlights three observations about the interaction among the three independent variables that reveals much about the nature of the information contained in sector orderflow. First, the orderflow factor with the maximal correlation with the expansion indicator has the ability to predict not only the expansion index, but also the 1-year bond return and to a lesser extent the stock market return (at least at the 1-month horizon). Notice at the one-month horizon, the best linear combination of the cross-section of sector orderflows for the expansion index is statistically significant and generates a  $R^2$  of 32%, 2% and 13% for the expansion index, stock and bond markets respectively. The lower explanatory power for the stock market is likely to depend on the relative importance of information about cash flows and discount rates changing over time, as shown in Boyd et al.

(2005). Second, the orderflow factors which have the highest correlation with the stock and bond markets have predictive power for the expansion index. For example, the combination of sector flows which best predicts the stock market (bond market) also has predictive power over the CFNAI index, with a statistically significant  $R^2$  of 22% (26%). Third, forecasting factors based on linear combinations of excess returns appear to have little explanatory power beyond their own market. Taken together these results suggest that orderflow contains more cross market information than returns. In addition, these observations are consistent with the existence of a single orderflow factor which is strongly related to macroeconomic information and has the ability to forecast performance within the economy and capital markets. Figure 2 summarizes these results by displaying the orderflow coefficients across select sectors. The stability of the coefficients across sectors provides a graphical representation for the intuition behind the existence of a single orderflow forecasting factor.

#### **5.4 Orderflow Dispersion within Sectors**

While our results clearly show that sector orderflow is the conduit for a substantial amount of macroeconomic information, the composition of that sector orderflow may also be important. We show in Section 3 that sector net orderflow is the sum of all orderflow for the individual stocks included in that sector. We conjecture that the variability of orderflow among stocks contained in the sector may be related to the strength of the macroeconomic signal. For example, a large net orderflow in one sector could be the result of investors increasing the weight of that sector in their portfolios or it could also be the result of a heavily traded single stock within the sector for reasons unrelated to expected economic conditions (e.g., stock picking

based on private information). If our conjecture is correct, our results should be stronger whenever orderflow within one sector is more homogeneous across stocks.<sup>8</sup>

Thus, we compute a measure of dispersion of orderflow within each sector as an indication of whether investors are trading the whole sector or just selected stocks. The sector orderflow dispersion at the monthly frequency is simply the standard deviation of unexpected flows for each stock. Unexpected flows are equal to the difference between total flows and expected flows (total sector flows multiplied by the relative market capitalization of the stock within the sector) for each stock.<sup>9</sup>

We aggregate sector orderflow dispersion at the market level using an average with two different weighting schemes. The first dispersion measure ( $\sigma_1$ ) uses weights corresponding to the monthly market capitalization of each sector. This method gives more importance to the dispersion of orderflow within large sectors. The second dispersion measure ( $\sigma_2$ ), weights orderflow dispersion by the absolute value of the correlations reported in Table 4, normalized to sum to one. This method gives more importance to the dispersion of orderflow within the sectors that matter more for predicting the economy.

In Table 11, we present the results of forecasting the expansion indicator, the stock market and the bond market with the sector flows in high and low dispersion states. In a given month, dispersion is high (low) when the aggregate standard deviation is above (below) its median in the last 12 months.<sup>10</sup> Our conjecture is clearly confirmed. When orderflow has low dispersion weighted by market capitalization ( $\sigma_1$ ), the explanatory power is between 1.47 and

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<sup>8</sup> Beber, Brandt, and Kavajecz (2008) is another example of a conditional analysis of orderflow and returns.

<sup>9</sup> The results are very similar if we use the range between the maximum and minimum value of unexpected orderflow or the absolute value of the orderflow skewness.

<sup>10</sup> The rolling threshold is preferred to a static threshold to avoid that conditional results pick up specific subsample periods. The results are robust to the choice of the rolling span (from 12 months to 36 months) and to the choice of the percentile (e.g., low dispersion as bottom quartile and high dispersion as top quartile).

1.83 times higher than with high dispersion. If we give more weight to the sectors that are more relevant for predicting the economy and the asset markets ( $\sigma_2$ ), the results are even more striking; in months with low dispersion the average explanatory power of flows doubles.

In summary, we find much stronger empirical results when we condition on low dispersion of orderflow within sectors. This is true across all three market variables as well as utilizing different weighting schemes, which demonstrates that our sector flow measures indeed capture the empirical foot-prints of sector rotation.

## **5.5 The Orderflow Mimicking Portfolio**

Thus far, our results are consistent with the notion that the magnitude, direction and timing of orderflow across sectors reflect information about the risk preferences, expectations and overall trading strategies of market participants. Following this line of reasoning within an asset pricing framework, if market-wide sector orderflow reflects the aggregate preferences and expectations within the market and aggregate trading does not simply reflect portfolio rebalancing as demonstrated by our findings, then market participants must necessarily hold portfolios that are different than the market portfolio. Therefore, as a capstone to our analysis we investigate the nature of the information contained in the movement of orderflow across sectors by constructing an orderflow mimicking portfolio.

Specifically, we construct and analyze a portfolio that mirrors the aggregate equity asset allocation of the investors initiating large trades, i.e. orderflow of large-sized orders. The intuition behind our empirical strategy is that movements of orderflow across the various sectors represent “tilts” to the market portfolio which define an orderflow mimicking portfolio, i.e. a market-wide portfolio that is potentially different from the traditional CAPM market portfolio.

This analysis represents an evaluation of the type and economic importance of the information contained in the cross-section of sector flows.

To implement such an orderflow portfolio, we start at the beginning of our sample with an equity portfolio where the allocations across sectors are determined by market capitalization weights. For each week, we compute the net *excess* orderflow of large-sized orders in different sectors as the difference between total orderflow for each sector and the *expected* orderflow, that is, orderflow expected given the market capitalization weight of each sector in the orderflow portfolio the previous week. Thus, the *excess* orderflow represents the proportion of the orderflow to the aggregate stock market that deviates from the current allocation based on current portfolio weights. We translate dollar flows into percentage weight changes through a simple normal cumulative density function normalization. Like most other asset allocation techniques, our procedure has the potential to generate extreme and unrealistic weights. For example, an extremely positive (negative) unexpected flow in one sector may translate into a 100% increase (decrease) in the weight of that sector in the orderflow portfolio. Since we rebalance the portfolio weekly, we impose a reality constraint of 1% on the maximum weekly adjustment, so that the largest possible change in a sector weight is 1% every week. Economically, this constraint on the sector weights might be viewed as a transaction costs or implementation constraint or even a risk management technique.

The orderflow mimicking portfolio that we constructed has properties that are not only interesting, but also consistent with our earlier results pertaining to the information content of sector orderflow. For example, Figure 3, Panel A, shows the cumulative return performance of investing \$1 in the orderflow portfolio compared with the market portfolio over our sample period. Clearly the orderflow portfolio outperforms the traditional market portfolio by

approximately 40% over the sample period (\$3.50 versus \$2.50). Moreover, a closer examination of the figure reveals that the orderflow portfolio does not suffer the 1999-2000 down-turn in the market portfolio, which is consistent with the orderflow portfolio being largely a defensive allocation strategy. Panel B of Figure 3 confirms this intuition as the orderflow portfolio loads heavily on low beta stocks over the course of the 1999-2000 recession period. Furthermore, the orderflow portfolio enjoys superior risk and return metrics compared to the market portfolio; the orderflow portfolio has an annual return, standard deviation and Sharpe ratio of 19.7%, 14.5% and 1.36 respectively, compared to 11.8%, 15.7% and 0.75 for the market portfolio.<sup>11</sup> Lastly, Panel C in Figure 3 shows that the sector weights appear to be well behaved ranging from a high of 30% to a low of 0% which argues for the feasible implementation of the orderflow portfolio.

We acknowledge that a number of assumptions were made to generate the orderflow portfolio results; however, our results are robust to a wide range of parametric assumptions. For example, the orderflow portfolio results still obtain (1) relaxing the dollar to percentage transformation, (2) utilizing a 1% to 100% weekly threshold range, and (3) irrespective of the timeframe analyzed (starting date).

Finally, it is important to be clear on what should be inferred from these results. Certainly the reader should not be surprised to know that a portfolio can be constructed that dominates the S&P500, this is just another manifestation of the Roll Critique. What is remarkable is that the information contained in orderflow across sectors has striking economic implications as reflected in an orderflow mimicking portfolio that clearly dominates the market

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<sup>11</sup> We have also examined the performance of the orderflow portfolio conditional on the dispersion of flows within sector, i.e. the “tilts” to the market portfolio are implemented only when flows’ dispersion is low or high. Consistent with previous results, the Sharpe ratio of the low dispersion strategy is higher than in the case of the high dispersion strategy.

portfolio. Moreover, the information contained in the orderflow portfolio is directly related to the macro economy, tends to be defensive in nature, and goes beyond the information captured by sector excess returns.<sup>12</sup>

## **6. Conclusion**

There is mounting evidence in the literature that the trade decisions of market participants incorporate their risk preferences, expectations and actual or perceived information. Armed with this evidence, we investigate what orderflow movements among equity sectors are able to tell us about the macro economy as well as the near term performance of the equity and bond markets.

We find that sector orderflow movements predict changes in the expansion/contraction index, the future performance of the bond markets and, to a lesser extent, the equity markets. In comparing the various orderflow factors which predict the economic expansion, stock and bond markets, we find that not only does orderflow contain more and different information compared to returns, but the nature of the information is common across the three markets and explicitly linked to information about the macro economy as seen through its relation to the non-farm payroll announcement. In addition, our results are stronger when flows are less dispersed within sectors, lending further support to our conjecture that the sector flows measures indeed reflect the empirical foot-prints of sector rotation. Finally, we investigate the nature and economic relevance of the information contained in sector orderflow movements within a portfolio context. Specifically, we translate sector orderflow movements into “tilts” to the market portfolio and produce an orderflow mimicking portfolio. This orderflow portfolio enjoys superior risk and

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<sup>12</sup> A potential concern might be that the results are proxying for other factors known to be priced. One specific concern might be the momentum factor at the industry level, which reflect information contained in sector returns. However, our results show that the orderflow portfolio is different from the momentum portfolio that has an annual return, standard deviation and Sharpe ratio of 22.4%, 25.1% and 0.89, respectively. Therefore, even though the momentum factor has superior returns, on a risk adjusted basis the orderflow portfolio produces superior performance and must therefore contain different information than merely momentum.

return properties relative to the traditional market portfolio or industry momentum portfolios, suggesting that flows contain asymmetric information in that it is primarily defensive in nature and largely related to wealth preservation.

Our analysis suggests that because sector orderflow aggregates the trading actions of market participants it necessarily synthesizes the collective risk preferences, expectations and information sets of market participants. Thus, utilizing the information within sector orderflow has the potential to reveal much about, not only the future performance of the economy and capital markets, but also concrete ways to improve our existing asset pricing models.

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## Appendix

### Sector definitions

The sectors are defined according to the Global Industry Classification Standard (GICS). The GICS was developed by Morgan Stanley Capital International and Standard & Poor's. The GICS structure consists of ten sectors, defined as follows.

**[10] ENE: Energy Sector** – The GICS Energy Sector comprises companies whose businesses are dominated by either of the following activities: The construction or provision of oil rigs, drilling equipment and other energy related service and equipment, including seismic data collection. Companies engaged in the exploration, production, marketing, refining and/or transportation of oil and gas products, coal and other consumable fuels.

**[15] MAT: Materials Sector** – The GICS Materials Sector encompasses a wide range of commodity-related manufacturing industries. Included in this sector are companies that manufacture chemicals, construction materials, glass, paper, forest products and related packaging products, and metals, minerals and mining companies, including producers of steel.

**[20] IND: Industrials Sector** – The GICS Industrials Sector includes companies whose businesses are dominated by one of the following activities: The manufacture and distribution of capital goods, including aerospace & defense, construction, engineering & building products, electrical equipment and industrial machinery, the provision of commercial services and supplies, including printing, employment, environmental and office services and the provision of transportation services, including airlines, couriers, marine, road & rail and transportation infrastructure.

**[25] CD: Consumer Discretionary Sector** – The GICS Consumer Discretionary Sector encompasses those industries that tend to be the most sensitive to economic cycles. Its manufacturing segment includes automotive, household durable goods, textiles & apparel and leisure equipment. The services segment includes hotels, restaurants and other leisure facilities, media production and services, and consumer retailing and services.

**[30] CS: Consumer Staples Sector** – The GICS Consumer Staples Sector comprises companies whose businesses are less sensitive to economic cycles. It includes manufacturers and distributors of food, beverages and tobacco and producers of non-durable household goods and personal products. It also includes food & drug retailing companies as well as hypermarkets and consumer super centers.

**[35] HC: Health Care Sector** – The GICS Health Care Sector encompasses two main industry groups. The first includes companies who manufacture health care equipment and supplies or provide health care related services, including distributors of health care products, providers of basic health-care services, and owners and operators of health care facilities and organizations. The second regroups companies primarily involved in the research, development, production and marketing of pharmaceuticals and biotechnology products.

**[40] FIN: Financial Sector** – The GICS Financial Sector contains companies involved in activities such as banking, mortgage finance, consumer finance, specialized finance, investment banking and brokerage, asset management and custody, corporate lending, insurance, and financial investment, and real estate, including REITs.

**[45] IT: Information Technology Sector** – The GICS Information Technology Sector covers the following general areas: firstly, Technology Software & Services, including companies that primarily develop software in various fields such as the Internet, applications, systems, databases management and/or home entertainment, and companies that provide information technology consulting and services, as well as data processing and outsourced services; secondly Technology Hardware & Equipment, including manufacturers and distributors of communications equipment, computers & peripherals, electronic equipment and related instruments; and thirdly, Semiconductors & Semiconductor Equipment Manufacturers.

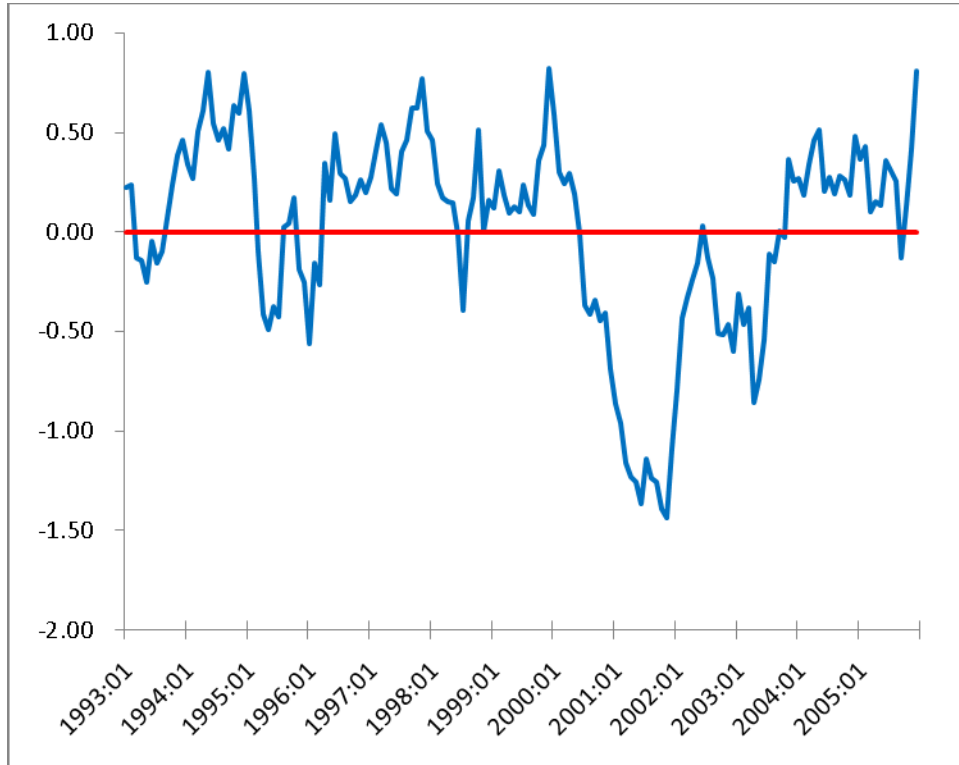
**[50] TEL: Telecommunications Services Sector** – The GICS Telecommunications Services Sector contains companies that provide communications services primarily through a fixed-line, cellular, wireless, high bandwidth and/or fiber optic cable network.

**[55] UTI: Utilities Sector** – The GICS Utilities Sector encompasses those companies considered electric, gas or water utilities, or companies that operate as independent producers and/or distributors of power.

**Figure 1**

**3-Month Moving Average of the Chicago Fed National Activity Index (CFNAI)**

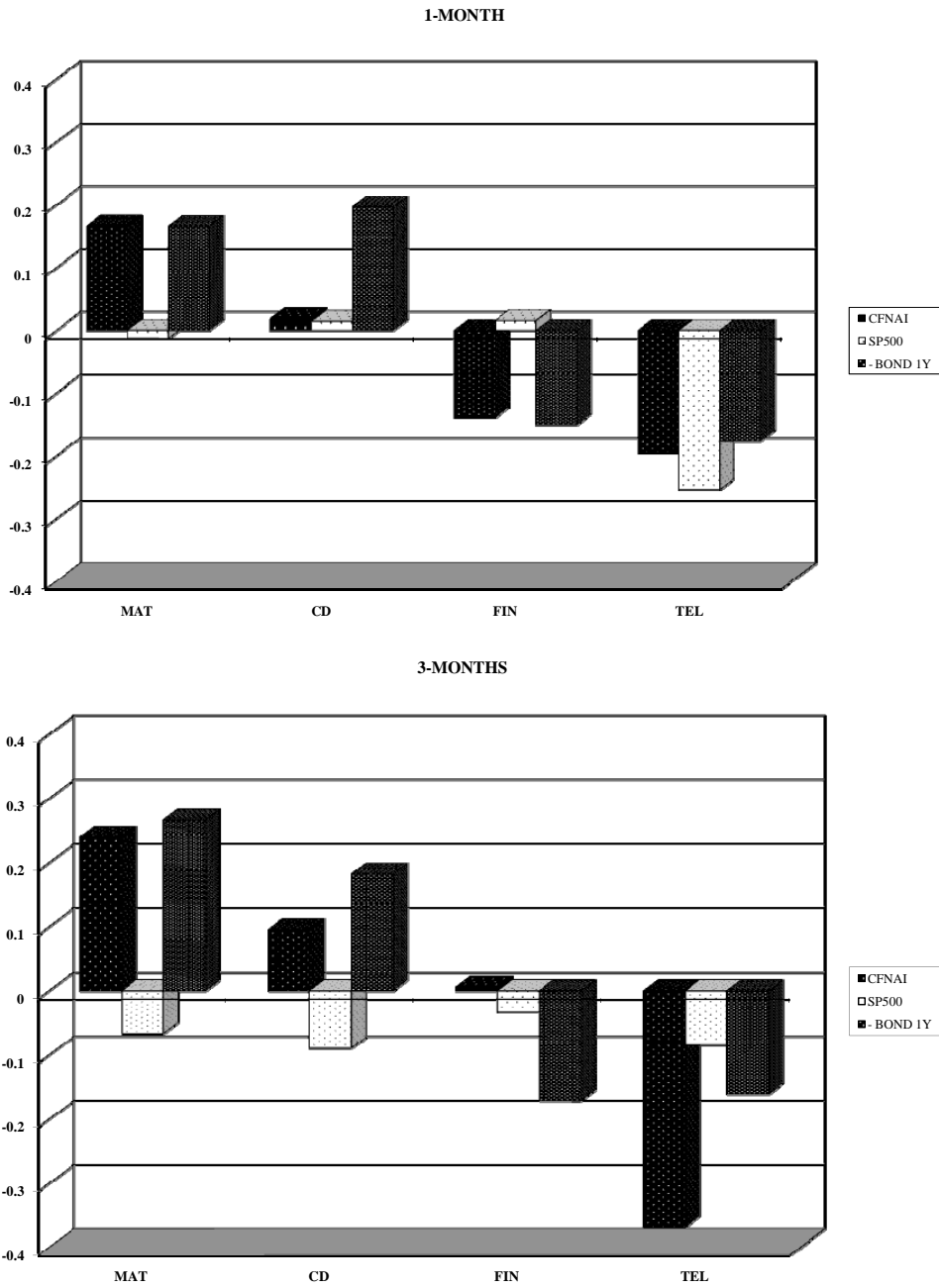
The CFNAI index is constructed to be a single summary measure (with mean zero and standard deviation of one) of the activity in four broad categories of the economy: production and income; employment, personal consumption which includes housing; and sales, orders, and inventories. For more detailed information concerning the CFNAI index see [http://www.chicagofed.org/economic\\_research\\_and\\_data/cfnai.cfm](http://www.chicagofed.org/economic_research_and_data/cfnai.cfm)



**Figure 2**

**Sector Coefficients from the Restricted Regressions**

This figure shows the coefficients on the orderflow of the four most significant sectors, materials, consumer discretionary, financials, telecommunications, predicting the expansion indicator (CFNAI), the stock market, and 1-year bond returns multiplied by -1, for the one and three month horizons.

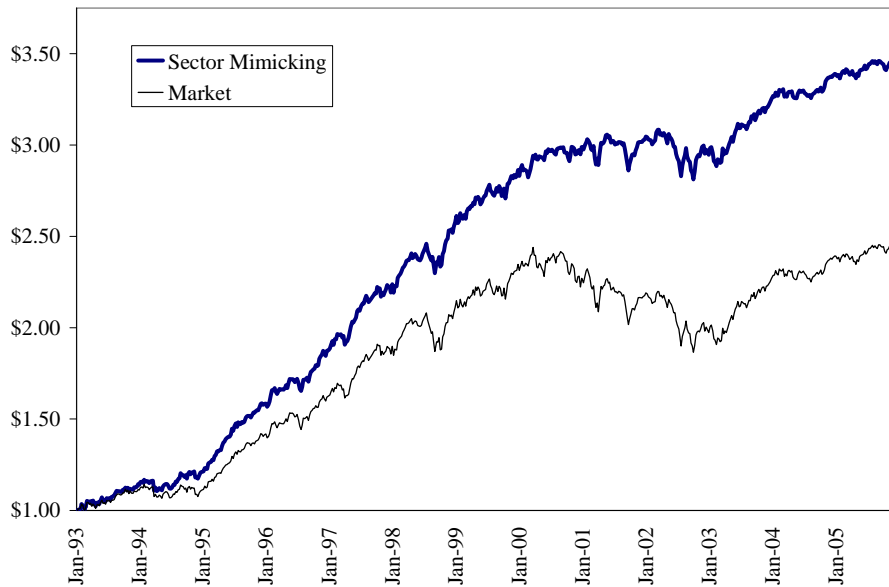


**Figure 3**

**Characteristics of the orderflow portfolio**

Panel A of this figure shows the cumulative return performance of investing \$1 in the orderflow portfolio compared with the market portfolio during our sample period. Panel B displays the rolling betas of the orderflow portfolio. Panel C graphs the sector weights of the orderflow portfolio.

**Panel A**



**Panel B**

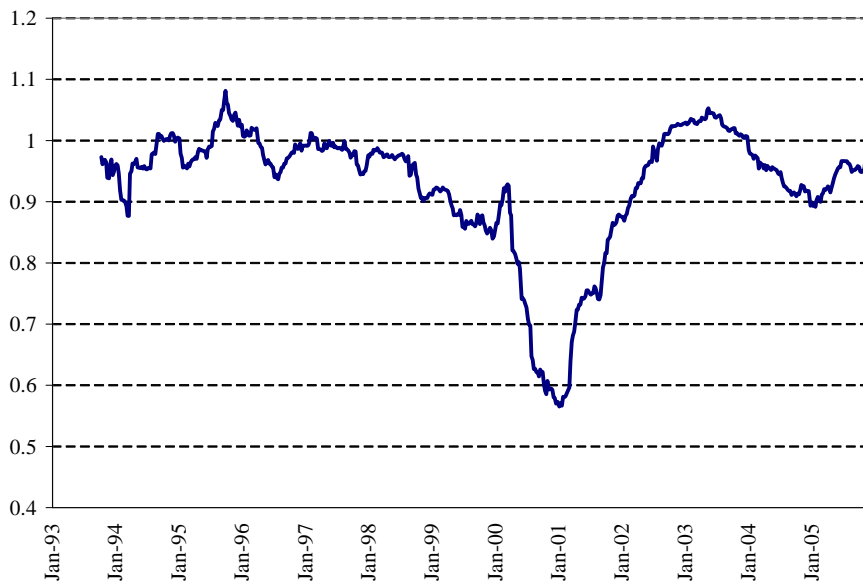
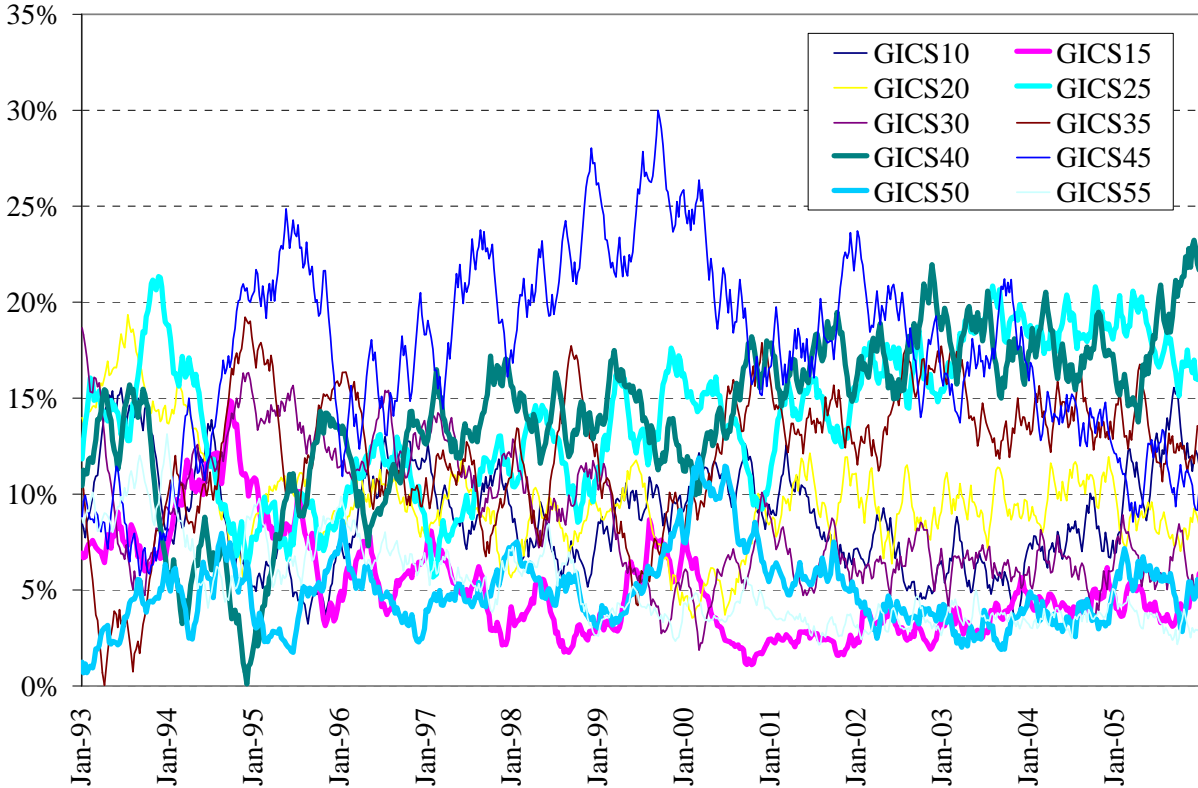


Figure 3, Continued

Panel C



**Table 1**  
**Aggregate Orderflow Summary Statistics**

This table shows aggregate net orderflow figures by sector and year expressed as a percentage of the total dollar net orderflow. Sector abbreviations are in the Appendix.

		<b>Panel A: All Orders</b>												
Sector		1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
10	ENE	12%	7%	6%	10%	9%	7%	9%	10%	9%	7%	7%	9%	14%
15	MAT	9%	12%	6%	7%	5%	4%	6%	3%	3%	4%	5%	6%	6%
20	IND	15%	9%	11%	10%	9%	9%	8%	7%	10%	9%	9%	10%	9%
25	CD	20%	11%	11%	13%	11%	13%	15%	12%	16%	18%	19%	19%	18%
30	CS	4%	11%	11%	12%	10%	9%	5%	7%	6%	6%	6%	6%	6%
35	HC	3%	14%	13%	11%	11%	13%	7%	15%	12%	13%	13%	13%	11%
40	FIN	11%	4%	13%	12%	15%	13%	14%	16%	16%	18%	18%	17%	18%
45	IT	11%	23%	19%	17%	20%	24%	27%	20%	21%	18%	17%	14%	12%
50	TEL	5%	4%	4%	3%	5%	4%	6%	7%	5%	3%	3%	3%	4%
55	UTI	9%	3%	6%	5%	4%	4%	3%	4%	3%	4%	4%	4%	3%
%		100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
\$		1,031	1,076	2,009	2,662	3,619	5,398	6,622	10,261	12,255	12,301	12,282	14,047	13,583
		<b>Panel B: Large Orders</b>												
Sector		1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
10	ENE	15%	8%	7%	11%	9%	7%	10%	10%	9%	6%	6%	8%	12%
15	MAT	8%	12%	6%	7%	5%	3%	7%	2%	2%	3%	4%	4%	4%
20	IND	16%	8%	10%	9%	8%	9%	8%	7%	10%	9%	10%	10%	8%
25	CD	22%	8%	9%	11%	10%	12%	16%	12%	15%	16%	19%	18%	18%
30	CS	3%	14%	13%	13%	11%	10%	5%	7%	6%	7%	6%	6%	6%
35	HC	0%	16%	14%	10%	11%	13%	7%	16%	13%	15%	14%	14%	13%
40	FIN	10%	3%	12%	10%	15%	13%	14%	17%	16%	18%	18%	17%	19%
45	IT	8%	20%	17%	18%	20%	23%	24%	15%	20%	19%	17%	14%	10%
50	TEL	5%	5%	5%	4%	5%	5%	6%	9%	6%	4%	3%	4%	6%
55	UTI	13%	5%	8%	7%	6%	5%	4%	4%	3%	3%	4%	4%	3%
%		100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
\$		622	829	1,317	1,957	2,436	3,765	4,491	7,027	7,648	6,803	5,963	6,444	5,157

**Table 2****Unconditional Relation between Unexpected Net Order Flow and Lagged Excess Returns**

This table contains the results of the following unconditional regression:

$$\frac{\text{Net Orderflow}_{j,t} - \text{Expected Net Orderflow}_{j,t}}{\text{Capsector}_{j,t}} = \alpha + \beta(\text{Ret}_{j,t-1} - \text{Ret}_{mkt,t-1}) + \varepsilon_{j,t}$$

Net Orderflow<sub>j,t</sub>, Expected Net Orderflow<sub>j,t</sub>, Ret<sub>j,t</sub> represent the actual net orderflow, the expected net orderflow, and the value-weighted return within sector *j* over week/month *t*. Ret<sub>mkt,t</sub> represents the value-weighted return on the stock market index. We compute the expected net orderflow for sector *j* as the total net orderflow to the stock market multiplied by the weight of sector *j* in the market. Panel A shows the results for orderflow and returns cumulated over a week, while Panel B shows the results for orderflow and returns cumulated over a month. White heteroschedastic consistent standard errors are shown in parentheses and \*, \*\*, \*\*\* denote significance at the 10%, 5%, and 1% level.

## Panel A: Weekly

Order Size	$\alpha$	$\beta$	R <sup>2</sup>	Obs.
Small	-1.1408 (14.9799)	749.906 * (480.896)	0.0002	6760
Medium	-9.3829 (52.5006)	6168.042 *** (2033.755)	0.0011	6760
Large	-32.2700 (84.1257)	21213.430 *** (4422.542)	0.0050	6760
All Orders	-42.7918 (136.5503)	28130.200 *** (6156.423)	0.0033	6760

## Panel B: Monthly

Order Size	$\alpha$	$\beta$	R <sup>2</sup>	Obs.
Small	-4.6312 (814.952)	730.6475 (1545.411)	0.0001	1550
Medium	-31.5317 (3862.058)	4974.594 ** (2298.435)	0.0002	1550
Large	12.5099 (5010.902)	-1973.620 (15356.10)	0.0001	1550
All Orders	-23.6266 (9552.792)	3727.440 (16945.52)	0.0001	1550

**Table 3****Relation between Expansions and past Unexpected Net Orderflow**

This table contains the results of the following unconditional regression:

$$CFNAI_t = \alpha + \beta \frac{(\text{Net Orderflow}_{j,t-1} - \text{Expected Net Orderflow}_{j,t-1})}{\text{Capsector}_{j,t}} + \phi CFNAI_{t-1} + \varepsilon_{j,t}$$

where  $\text{Net Orderflow}_{j,t}$ ,  $\text{Expected Net Orderflow}_{j,t}$ ,  $\text{Capsector}_{j,t}$  represent the actual net orderflow, the expected net orderflow, the capitalization of sector  $j$  over month  $t$ . We compute the expected net orderflow for sector  $j$  as the total net orderflow to the stock market multiplied by the weight of sector  $j$  in the market portfolio. The regressor is standardized. White heteroschedastic consistent standard errors are shown in parentheses and \*, \*\*, \*\*\* denote significance at the 10%, 5%, and 1% level, respectively.

## Panel A: One-Month Lead

Sector	Small		Medium		Large		Obs.
	$\beta$	R <sup>2</sup>	$\beta$	R <sup>2</sup>	$\beta$	R <sup>2</sup>	
10 ENE	-0.0197	0.1830	-0.0014	0.1820	0.0012	0.1820	155
15 MAT	0.0042	0.1821	0.0203	0.1831	0.1423 **	0.2317	155
20 IND	-0.0593	0.1911	0.0688	0.1937	0.0385	0.1859	155
25 CD	0.0141	0.1825	-0.0691	0.1938	-0.0971 **	0.2042	155
30 CS	-0.0345	0.1851	0.0503	0.1882	0.0878 *	0.2002	155
35 HC	0.0166	0.1827	0.0800	0.1963	-0.0033	0.1821	155
40 FIN	-0.0277	0.1840	-0.0988 **	0.2060	-0.1599 ***	0.2439	155
45 IT	0.0646	0.1927	-0.0065	0.1821	0.0498	0.1885	155
50 TEL	0.0461	0.1876	-0.1250 **	0.2181	-0.1675 ***	0.2427	155
55 UTI	-0.2032 ***	0.2796	-0.2080 ***	0.2894	-0.0256	0.1837	155

## Panel B: Three-Month Lead

Sector	Small		Medium		Large		Obs.
	$\beta$	R <sup>2</sup>	$\beta$	R <sup>2</sup>	$\beta$	R <sup>2</sup>	
10 ENE	-0.0021	0.2511	0.0095	0.2513	-0.0517	0.2581	153
15 MAT	0.0459	0.2558	0.0324	0.2536	0.1741 ***	0.3261	153
20 IND	-0.0908 *	0.2697	0.0811 *	0.2668	0.0670 *	0.2629	153
25 CD	0.0574	0.2587	-0.0181	0.2519	-0.0837 *	0.2675	153
30 CS	-0.0743	0.2635	0.0246	0.2521	0.0909 *	0.2706	153
35 HC	-0.0158	0.2517	0.0552	0.2577	-0.0021	0.2511	153
40 FIN	-0.0281	0.2529	-0.0356	0.2539	-0.1117 ***	0.2811	153
45 IT	0.0664	0.2622	-0.0387	0.2549	0.0236	0.2525	153
50 TEL	0.0663	0.2625	-0.1071 **	0.2778	-0.2112 ***	0.3484	153
55 UTI	-0.1491 ***	0.3028	-0.2057 ***	0.3495	-0.0391	0.2549	153

**Table 4****Relation between Expansions and past Unexpected Net Orderflow**

This table contains pairwise correlations between the best linear combination of unexpected orderflow that predicts the economy (CFNAI) and each sector unexpected orderflow:

$$\frac{(\text{Net Orderflow}_{j,t-1} - \text{Expected Net Orderflow}_{j,t-1})}{\text{Capsector}_{j,t}}$$

where  $\text{Net Orderflow}_{j,t}$ ,  $\text{Expected Net Orderflow}_{j,t}$ ,  $\text{Capsector}_{j,t}$  represent the actual net orderflow, the expected net orderflow, the capitalization of sector  $j$  over month  $t$ . We compute the expected net orderflow for sector  $j$  as the total net orderflow to the stock market multiplied by the weight of sector  $j$  in the market portfolio. \*, \*\*, \*\*\* denote significance at the 10%, 5%, and 1% level, respectively. We also report the  $R^2$  of the multivariate regression of the expansion indicator on the unexpected orderflow in all ten sectors that we use to obtain the best linear combination.

Sector		Panel A: One-Month Lead		
		Small	Medium	Large
		Correlations		
10	ENE	-0.0638	0.0215	-0.0059
15	MAT	0.0042	0.0617	0.6146 ***
20	IND	-0.2385 ***	0.3101 ***	0.1786 **
25	CD	0.0351	-0.3198 ***	-0.4624 ***
30	CS	-0.128	0.2541 ***	0.4311
35	HC	0.0867	0.3786 ***	0.0985
40	FIN	-0.1013	-0.4105 ***	-0.6781 ***
45	IT	0.2524 ***	-0.0617	0.2197 ***
50	TEL	0.1762 **	-0.5173 ***	-0.6997 ***
55	UTI	-0.8188 ***	-0.7569 ***	-0.0275
$R^2$		0.3354	0.3720	0.3304

Sector		Panel B: Three-Month Lead		
		Small	Medium	Large
		Correlations		
10	ENE	0.0380	0.0863	-0.1777 **
15	MAT	0.2305 ***	0.1454 **	0.6232 ***
20	IND	-0.4256 ***	0.2970 ***	0.2417 ***
25	CD	0.2807 ***	-0.1111	-0.3583 ***
30	CS	-0.3541 ***	0.1005	0.3833 ***
35	HC	-0.095	0.2476 ***	0.1066
40	FIN	-0.0494	-0.1246 *	-0.4274 ***
45	IT	0.2682 ***	-0.1882 **	0.0974
50	TEL	0.3148 ***	-0.4473 ***	-0.7255 ***
55	UTI	-0.6879 ***	-0.7697 ***	-0.0584
$R^2$		0.3707	0.4289	0.4666

**Table 5**

**Relation between Stock Market and past Unexpected Net Orderflow**

This table contains the results of the following unconditional regression:

$$SP500_t = \alpha + \beta \frac{(\text{Net Orderflow}_{j,t-1} - \text{Expected Net Orderflow}_{j,t-1})}{\text{capsector}_{j,t}} + \phi SP500_{t-1} + \varepsilon_{j,t}$$

where  $\text{Net Orderflow}_{j,t}$ ,  $\text{Expected Net Orderflow}_{j,t}$ ,  $\text{Capsector}_{j,t}$  represent the actual net orderflow, the expected net orderflow, the capitalization of sector  $j$  over month  $t$ . We compute the expected net orderflow for sector  $j$  as the total net orderflow to the stock market multiplied by the weight of sector  $j$  in the market. The regressor is standardized. White heteroschedastic consistent standard errors are shown in parentheses and \*, \*\*, \*\*\* denote significance at the 10%, 5%, and 1% level.

Panel A: One-Month Lead

Sector		Small		Medium		Large		Obs.
		$\beta$	R <sup>2</sup>	$\beta$	R <sup>2</sup>	$\beta$	R <sup>2</sup>	
10	ENE	-0.0002	0.0005	-0.0010	0.0010	-0.0024	0.0038	155
15	MAT	-0.0035	0.0071	-0.0043	0.0107	0.0016	0.0019	155
20	IND	0.0003	0.0005	0.0048	0.0143	0.0032	0.0063	155
25	CD	-0.0014	0.0017	-0.0037	0.0085	-0.0060 *	0.0210	155
30	CS	0.0015	0.0018	0.0048	0.0137	0.0047	0.0131	155
35	HC	0.0022	0.0033	0.0067 *	0.0266	0.0013	0.0014	155
40	FIN	-0.0012	0.0013	-0.0020	0.0028	-0.0042	0.0109	155
45	IT	0.0040	0.0090	-0.0019	0.0024	0.0037	0.0082	155
50	TEL	-0.0025	0.0042	-0.0075 **	0.0327	-0.0097 ***	0.0547	155
55	UTI	-0.0070 **	0.0274	-0.0039	0.0080	0.0051	0.0156	155

Panel B: Three-Month Lead

Sector		Small		Medium		Large		Obs.
		$\beta$	R <sup>2</sup>	$\beta$	R <sup>2</sup>	$\beta$	R <sup>2</sup>	
10	ENE	0.0020	0.0070	-0.0014	0.0061	-0.0009	0.0055	153
15	MAT	-0.0015	0.0062	-0.0024	0.0081	-0.0010	0.0056	153
20	IND	-0.0001	0.0050	0.0036	0.0123	0.0048	0.0188	153
25	CD	-0.0020	0.0072	-0.0036	0.0123	-0.0063 *	0.0277	153
30	CS	0.0021	0.0071	0.0056 *	0.0228	0.0063 *	0.0282	153
35	HC	0.0004	0.0051	0.0056 *	0.0229	0.0037	0.0128	153
40	FIN	-0.0050	0.0181	-0.0031	0.0100	-0.0038	0.0135	153
45	IT	0.0045 *	0.0159	-0.0033	0.0108	0.0007	0.0053	153
50	TEL	-0.0009	0.0055	-0.0049	0.0190	-0.0061 *	0.0263	153
55	UTI	-0.0054	0.0203	0.0022	0.0072	0.0026	0.0089	153

**Table 6**  
**Relation between Bond returns and past Unexpected Net Orderflow**

This table contains the results of the following unconditional regression:

$$1y\text{BondRet}_t = \alpha + \beta \frac{(\text{Net Orderflow}_{j,t-1} - \text{Expected Net Orderflow}_{j,t-1})}{\text{capsector}_{j,t}} + \phi \text{BondRet}_{t-1} + \varepsilon_{j,t}$$

where  $\text{Net Orderflow}_{j,t}$ ,  $\text{Expected Net Orderflow}_{j,t}$ ,  $\text{Capsector}_{j,t}$  represent the actual net orderflow, the expected net orderflow, the capitalization of sector  $j$  over month  $t$ . We compute the expected net orderflow for sector  $j$  as the total net orderflow to the stock market multiplied by the weight of sector  $j$  in the market. The regressor is standardized. White heteroschedastic consistent standard errors are shown in parentheses and \*, \*\*, \*\*\* denote significance at the 10%, 5%, and 1% level.

Panel A: One-Month Lead

Sector	Small		Medium		Large		Obs.
	$\beta$	R <sup>2</sup>	$\beta$	R <sup>2</sup>	$\beta$	R <sup>2</sup>	
10 ENE	-0.0001	0.0834	-0.0002	0.0890	-0.0001	0.0822	155
15 MAT	-0.0003 *	0.0925	-0.0004 **	0.1073	-0.0005 ***	0.1250	155
20 IND	0.0004 **	0.1067	0.0001	0.0822	0.0001	0.0827	155
25 CD	-0.0002	0.0885	-0.0001	0.0825	-0.0001	0.0822	155
30 CS	0.0003 *	0.0970	0.0001	0.0844	0.0001	0.0822	155
35 HC	0.0001	0.0842	0.0001	0.0821	0.0001	0.0835	155
40 FIN	0.0001	0.0823	0.0005 ***	0.1266	0.0005 ***	0.1165	155
45 IT	-0.0001	0.0828	-0.0001	0.0821	-0.0002	0.0866	155
50 TEL	-0.0005 **	0.1189	0.0001	0.0855	0.0003 *	0.0988	155
55 UTI	0.0004 **	0.1042	0.0007 ***	0.1497	0.0003 *	0.0942	155

Panel B: Three-Month Lead

Sector	Small		Medium		Large		Obs.
	$\beta$	R <sup>2</sup>	$\beta$	R <sup>2</sup>	$\beta$	R <sup>2</sup>	
10 ENE	-0.0001	0.0344	-0.0001	0.0337	0.0003	0.0482	153
15 MAT	-0.0003 **	0.0490	-0.0004 ***	0.0608	-0.0008 ***	0.1277	153
20 IND	0.0004 **	0.0546	-0.0001	0.0327	-0.0001	0.0342	153
25 CD	-0.0003 **	0.0471	-0.0001	0.0331	0.0001	0.0324	153
30 CS	0.0004 **	0.0544	0.0001	0.0350	0.0001	0.0321	153
35 HC	0.0002	0.0395	-0.0001	0.0328	-0.0001	0.0324	153
40 FIN	-0.0002	0.0402	0.0003	0.0475	0.0006 ***	0.0860	153
45 IT	0.0001	0.0321	0.0001	0.0323	-0.0002	0.0367	153
50 TEL	-0.0004 **	0.0568	0.0001	0.0354	0.0004	0.0542	153
55 UTI	0.0003	0.0433	0.0008 ***	0.1248	0.0002	0.0386	153

**Table 7**  
**Relation between Expansions and past excess sector returns**

This table contains the results of the following bivariate unconditional regression:

$$CFNAI_t = \alpha + \beta (\text{Ret}_{j,t} - \text{Ret}_{mkt,t}) + \phi CFNAI_{t-1} + \varepsilon_{j,t}$$

where  $\text{Ret}_{j,t}$  represent the value-weighted return of sector  $j$  over month  $t$ ,  $\text{Ret}_{mkt,t}$  represents the value-weighted return on the stock market index, and CFNAI is the expansion indicator.

We report the  $R^2$  of the regressions together with  $R^2_{\text{ofl}}$ , which is the  $R^2$  of the large orderflow regressions reported in Table 3. The excess return regressor is standardized.

\*, \*\*, \*\*\* denote significance at the 10%, 5%, and 1% level with White heteroschedastic consistent standard errors.

Sector	One-month lead			Three-month lead		
	$\beta$	$R^2$	$R^2_{\text{ofl}}$	$\beta$	$R^2$	$R^2_{\text{ofl}}$
10 ENE	-0.0586	0.1910	0.1820	-0.0217	0.2523	0.2581
15 MAT	-0.0468	0.1877	0.2317	-0.0055	0.2512	0.3261
20 IND	-0.0520	0.1891	0.1859	-0.0236	0.2525	0.2629
25 CD	-0.0857 **	0.2012	0.2042	-0.0841 **	0.2697	0.2675
30 CS	-0.1191 ***	0.2192	0.2002	-0.1004 **	0.2776	0.2706
35 HC	-0.1317 ***	0.2273	0.1821	-0.0849 **	0.2699	0.2511
40 FIN	-0.0822 *	0.1997	0.2439	-0.0923 **	0.2733	0.2811
45 IT	0.0747	0.1966	0.1885	0.0383	0.2549	0.2525
50 TEL	0.0359	0.1854	0.2427	0.0232	0.2525	0.3484
55 UTI	-0.1618 ***	0.2507	0.1837	-0.0998 **	0.2773	0.2549
Ave		0.2047	0.2045		0.2631	0.2773

**Table 8**  
**Relation between Business Cycle, Stock Market Returns, Bond Market Returns**  
**and past Unexpected Net Orderflow and returns**

This table contains the results of the following unconditional regression:

$$Y_t = \alpha + \sum_{j=1}^{10} \beta_j \frac{(\text{Net Orderflow}_{j,t-1} - \text{Expected Net Orderflow}_{j,t-1})}{\text{capsector}_{j,t}} + \sum_{j=1}^{10} \delta_j (\text{Ret}_{j,t-1} - \text{Ret}_{\text{mkt},t-1}) + \phi Y_{t-1} + \varepsilon_{j,t}$$

where  $\text{Net Orderflow}_{j,t}$ ,  $\text{Expected Net Orderflow}_{j,t}$ ,  $\text{Capsector}_{j,t}$ ,  $\text{Ret}_{j,t}$  represent the actual net orderflow, the expected net orderflow, the capitalization, the value-weighted return, of sector  $j$  over month  $t$ .  $\text{Ret}_{\text{mkt},t}$  represents the value-weighted return on the stock market index. We compute the expected net orderflow for sector  $j$  as the total net orderflow to the stock market multiplied by the weight of sector  $j$  in the market. In Panel A, B, and C,  $Y_t$  is the CFNAI index, the S&P500 return, and the 1-year bond return, respectively.

Regressors	Adj-R <sup>2</sup> (1-mo ahead)	Adj-R <sup>2</sup> (3-mo ahead)
Panel A: CFNAI		
Small Unexpected NOF	0.2843	0.3216
Medium Unexpected NOF	0.3237	0.3844
Large Unexpected NOF	0.2789	0.4250
Excess Returns	0.2473	0.2708
Large Unexpected NOF + excess returns	0.3329	0.4396
Panel B: S&P500 return		
Small Unexpected NOF	0.0034	0.0121
Medium Unexpected NOF	0.0023	-0.0058
Large Unexpected NOF	0.0160	-0.0319
Excess Returns	-0.0087	0.0178
Large Unexpected NOF + excess returns	-0.0092	-0.0006
Panel C: 1-year Bond return		
Small Unexpected NOF	0.1294	0.0334
Medium Unexpected NOF	0.1694	0.1178
Large Unexpected NOF	0.1284	0.1433
Excess Returns	0.0962	0.0159
Large Unexpected NOF + excess returns	0.1562	0.1341

**Table 9****Relation between equity flows and non-farm Payroll surprises**

This table shows the results of estimating the following regression:

$$F_{t,t+\tau} = \alpha + \beta \frac{(NFP_{ACT,t} - NFP_{EXP,t})}{\sigma_s} + \varepsilon$$

where  $F$  is a linear combination of sector flows or returns in the period  $\tau$  following the non-farm Payroll release at  $t$ ,  $NFP_{ACT,t}$  is the actual NFP release,  $NFP_{EXP,t}$  is the median forecast, and  $\sigma_s$  is the standard deviation of the NFP surprise.  $\tau$  is either one week or one month. The loadings in the linear combination are the ones with maximal correlation with changes in the expansion index (CFNAI), stock market returns (SP500), or 1-year bond returns.

\*, \*\*, \*\*\* denote a significant coefficient at the 10%, 5%, and 1% level, with White-heteroschedastic consistent standard errors.

Dependent variable	Weekly		Monthly	
	$\beta$	R <sup>2</sup>	$\beta$	R <sup>2</sup>
Panel A: Flows				
CFNAI	0.0439**	0.02	0.0453***	0.03
SP500	-0.0004	0.00	0.0002	0.00
Bond	-0.0002***	0.03	-0.0001**	0.01
Panel B: Returns				
CFNAI	-0.0191	0.00	-0.0077	0.00
SP500	-0.0004	0.00	-0.0002	0.00
Bond	0.0001	0.01	0.0001	0.00

**Table 10**  
**Restricted regressions**

This table shows the explanatory power of regressing future values of the expansion indicator, the stock market return, and the bond market return on the current value of the dependent variable and a forecasting factor. The forecasting factor is a linear combination of either unexpected flows or excess sector returns, where the loadings are computed as the ones with the maximal correlation with each of the dependent variables in turn. We report only the adjusted-R<sup>2</sup>. \*, \*\*, \*\*\* denote a significant coefficient on the factor at the 10%, 5%, and 1% level, with White heteroschedastic consistent standard errors.

**Panel A: Dependent Variable CFNAI**

Regressor	Loadings with maximal correlation on	1-mo ahead Adj-R <sup>2</sup>	3-mo ahead Adj-R <sup>2</sup>
Current CFNAI		0.18 ***	0.25 ***
Unexpected orderflow	CFNAI	0.32 ***	0.46 ***
	SP500	0.22 ***	0.27 ***
	1-y Bond	0.26 ***	0.39 ***
Excess returns	CFNAI	0.29 ***	0.31 ***
	SP500	0.18	0.25
	1-y Bond	0.26 ***	0.29 ***

**Panel B: Dependent Variable S&P500**

Regressor	Loadings with maximal correlation on	1-mo ahead Adj-R <sup>2</sup>	3-mo ahead Adj-R <sup>2</sup>
Current CFNAI		-0.01	0.00
Unexpected orderflow	CFNAI	0.02 **	0.00
	SP500	0.07 ***	0.03 **
	1-y Bond	0.00	-0.01
Excess returns	CFNAI	-0.01	0.00
	SP500	0.05 ***	0.08 ***
	1-y Bond	-0.01	-0.01

**Panel C: Dependent Variable 1-y bond returns**

Regressor	Loadings with maximal correlation on	1-mo ahead Adj-R <sup>2</sup>	3-mo ahead Adj-R <sup>2</sup>
Current CFNAI		0.08 ***	0.03 ***
Unexpected orderflow	CFNAI	0.13 ***	0.14 ***
	SP500	0.08	0.02
	1-y Bond	0.18 ***	0.19 ***
Excess returns	CFNAI	0.13 ***	0.05 **
	SP500	0.07	0.02
	1-y Bond	0.15 ***	0.06 ***

**Table 11**

**Relation between economy, financial markets and orderflow with low/high dispersion**

This table contains the  $R^2$  of the following regression:

$$Y_t = \alpha + \sum_{j=1}^{10} \beta_j \frac{(\text{Net Orderflow}_{j,t-1} - \text{Expected Net Orderflow}_{j,t-1})}{\text{Capsector}_{j,t}} + \phi Y_{t-1} + \varepsilon_{j,t}$$

where  $Y_t$  is either the CFNAI indicator, stock market returns, or bond market returns. Net Orderflow<sub>j,t</sub>, Expected Net Orderflow<sub>j,t</sub>, Capsector<sub>j,t</sub> represent the actual net orderflow, the expected net orderflow, the capitalization of sector  $j$  over month  $t$ . We compute the expected net orderflow for sector  $j$  as the total net orderflow to the stock market multiplied by the weight of sector  $j$  in the market portfolio.

The regression is estimated conditional on low or high dispersion of orderflow within sectors. We measure dispersion as the standard deviation of unexpected flows within each sector. We aggregate dispersion at the market level using either the market capitalization of each sector ( $\sigma_1$ ) or the absolute value of the correlations reported in Table 4 and normalized to sum up to one ( $\sigma_2$ ). In a given month, dispersion is high (low) when the standard deviation is above (below) its median in the last 12 months.

	CFNAI	Comparison of $R^2$	
		Stock Market	Bond Market 1y
Dispersion with Market Cap Weights ( $\sigma_1$ )			
Low dispersion	0.54	0.22	0.28
High dispersion	0.34	0.12	0.19
Ratio (Low/High)	1.59	1.83	1.47
Dispersion with Correlation Weights ( $\sigma_2$ )			
Low dispersion	0.47	0.20	0.31
High dispersion	0.28	0.08	0.16
Ratio (Low/High)	1.68	2.50	1.94