Industry momentum and reversals in stock markets

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**Abstract**

Although price trends such as momentum and reversal patterns of stock prices are well established in the literature, little is known whether price patterns still hold at the international level. Using data from over 24,000 stock prices, the analysis forms international within and across industries portfolios for the EU and the Asia/Pacific regions and studies the presence of momentum and reversal patterns, compared with the typical benchmark, which is the U.S. market. Interestingly, it finds that both patterns are related to low capitalized firms. Price reversals appearing only at the short-run validating the liquidity constraint assumption, while momentum holds for a longer period and is related to investors’ underreaction. Finally, it finds that only a few sectors can predict the market as an indirect result of momentum. A trading strategy that builds on industries’ portfolios own predictive ability beats the market. Overall, matching returns patterns from the national to the international level supports the presence of unobserved risk factors and behavioral biases.

**Keywords**: Reversal strategy; momentum strategy; underreaction, industry portfolios.

**Data Availability Statement**: The data that support the findings of this study are available from Thompson – Reuters through *Worldscope* database. Restrictions apply to the availability of these data, which were used under license for this study.

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1. **Introduction**

Successful forecasting of the financial performance in the short- and the long-term is a crucial element in shaping profitable investing decisions. The determination of the price path of a stock is usually attributed to firm’s own fundamentals, price trends (price momentum and reversals), investors’ biases and heuristics, and limits to arbitrage (effectiveness of arbitrage in different circumstances, liquidity/capital limitations). In particular, biases, such as over and underreaction, and the gradual information dispersion hypothesis, are well established in the relevant literature and affect long-term forecasting (De Bondt & Thaler, 1985; Barberis et al., 1998; Daniel et al. 1998; Hong and Stein, 1999). Importantly, [Jegadeesh (1990)](https://onlinelibrary.wiley.com/doi/full/10.1111/j.1540-6261.1996.tb05222.x?casa_token=saHtJDpXgQkAAAAA%3AKXVpU7VaXJruRmHxiEThcz-ESNAjMoyeA_nd6-cS3857JF9AGI7LmWE8dLGf9liKtTqf57H3gHFjhQ#jofi5222-bib-0022) and [Lehmann (1990)](https://onlinelibrary.wiley.com/doi/full/10.1111/j.1540-6261.1996.tb05222.x?casa_token=saHtJDpXgQkAAAAA%3AKXVpU7VaXJruRmHxiEThcz-ESNAjMoyeA_nd6-cS3857JF9AGI7LmWE8dLGf9liKtTqf57H3gHFjhQ#jofi5222-bib-0032) find short-term return reversals, while [Jegadeesh and Titman (1993)](https://onlinelibrary.wiley.com/doi/full/10.1111/j.1540-6261.1996.tb05222.x?casa_token=saHtJDpXgQkAAAAA%3AKXVpU7VaXJruRmHxiEThcz-ESNAjMoyeA_nd6-cS3857JF9AGI7LmWE8dLGf9liKtTqf57H3gHFjhQ#jofi5222-bib-0023) document that past winners on average continue to outperform past losers, so that there is momentum in stock prices.

While both momentum and contrarian (reversal) investment strategies are considered as stylized facts, most studies focus on the U.S. or national markets and the examination of price trends in international portfolios is scarce. The introduction of the common currency across the Eurozone and a harmonized supervision framework for stock markets across the European Union (EU), alleviated many of capital mobility restrictions of the past. In tandem, the Association of Southeast Asian Nations (ASEAN) and the Chiang Mai multilateral currency swap initiatives promote economic integration in the Southeast Asia, transforming the terms of global trade and the face of the global economy. The aforementioned developments are fostering international portfolio formations within the stock markets of the EU or the Asia\Pacific region making evident the analysis of price trends on international level.

This paper attempts to bridge this gap, by discussing pricing effects on international portfolios formed at the supra-national level for the European region and the South-East Asia region, arising from asymmetric diffusion of information, and over- and underreaction to financial news (Barberis et al., 1998). Detecting price reversals and momentum at the international level alleviates the notion that price patterns reported in the literature at the national level are unusual phenomena that should be attributed to an elaborate data snooping scheme and even chances. To enhance our understanding on the matter and to make our arguments comparable to the benchmark in the related literature, the analysis also examines the U.S. market that is closely linked with all stock markets in the aforementioned regions (Sarno et al., 2016).

Addressing this issue is a relative challenge, since the existing literature is scarce and most studies on processing financial information (Hong and Stein, 1999; Hong et al., 2007) and systematic mispricing of trend (Daniel and Moskowitz, 2016; Kariofyllas et al., 2017) focus on individual stock markets; typically on U.S. data (Barberis et al., 1998; Vayanos and Wooley, 2013; Hameed and Mian, 2015). The overall objective of this research is not to develop a new theory explaining momentum and reversal patterns. Rather it contributes to the literature by providing new empirical results on the presence of momentum and reversal patterns, as European and Asia/Pacific stock markets are under-investigated towards this end relative to the U.S stock market.

Regarding reversals, Hameed and Mian (2015) argue that short-term reversals stem from liquidity provisions and thus they can be considered as firm specific patterns. In doing so, they decompose each reversal strategy to an individual stock effect and a sectoral effect. At the individual stock level or intra-industry return reversals, loser and winner stocks are defined based on their performance relative to their industry benchmark, while on the sectoral level, the industry-specific or inter-industry return reversals involve buying (selling) the industry portfolios that have underperformed (outperformed) the market portfolio. This liquidity provision explanation on the intra-industry level seems to be the source of the profits from the standard reversal strategies (Da et al., 2011). This paper extends the work of Hameed and Mian (2015) to international portfolios, where the investor has many potential liquidity sources when building a sectoral portfolio.

In testing momentum and price reversals, the analysis uses a comprehensive dataset comprising of stocks from 14 European stock markets, 12 Asia/Pacific stock markets and the New York Stock Exchange (NYSE) and the Nasdaq stock markets. The motivation in selecting the specific European stock markets stems from their participation to the EU, the Eurozone, and their respective capitalization. In this manner we are able to generate portfolios that are adequately differentiated and relieved from national macroeconomic and financial drivers (Gupta et al., 2010). The same approach is held for the Asia/Pacific region. The sample spans the period January 2000-June 2017 to ensure the inclusion of significant economic events that influence the global stock market, such as the 2007 economic crisis, the 2010 European sovereign crisis, and the various quantitative easing cycles of the European economies after 2009. Special care has been taken that all stocks participating in the portfolio formation are active, at least for half of the time period under examination.

To test the robustness of the results, the analysis controls for capitalization (lowest and highest 20% capitalized stocks), spatial orientation, and participation to monetary/trade unions of the nations where stocks are traded. The intuition behind the cutoff of the highest and the lowest 20% capitalized stocks stems from Hong et al. (2007) and Lewellen (2002). In both studies the authors argue that low-capitalized firms exhibit limited investors’ participation and lower analysts’ coverage than higher-capitalized firms, which results in a slower information diffusion pattern. Thus, in this category of stocks, we often observe supply-shock induced reversals, overreaction of traders and price reversals. In contrast, large capitalized stocks often lead the market, and this is more pronounced in industry portfolios with high positive momentum returns due to conservatism and underreaction (Hong and Stein, 1999).

The spatial separation to Northern EU (Austria, Belgium, Denmark, Finland, France, Germany, U.K, Norway, Sweden) and Southern EU (Cyprus, Greece, Italy, Portugal, Spain) stock markets is attributed to the aggregation provided from the European Commission after the European sovereign crisis of 2010, during which the Southern EU countries were forced to enter into bail out programs that reduced considerably their stock market capitalization. The analysis follows a similar scheme for the Asia/Pacific sample based on the same capitalization thresholds (20% - 80%), while it also examines spatial separation of the sample according to the stock markets that participate in the Chiang Mai Initiative (CMI); a multilateral currency swap arrangement that significantly enhances the ability of capital allocation across different markets. Finally, it takes into account the participation in Eurozone and the ASEAN, i.e. two monetary/trade unions that enhance capital transferring across markets. For the U.S. stock market spatial segregation is irrelevant.

As a proxy for the market index, it uses the Eurostoxx 600 index for the European area and the STOXX Asia/Pacific 600 index for the Asian/Pacific area, since national stock market indices are inadequate, given their dependence on the market they are intended to describe. It chooses the Dow Jones Industrial index (DJ) for the U.S. market, due to its higher capitalization in comparison to other market indices. The Eurostoxx 600 index is derived from the STOXX Europe Total Market Index (TMI), with a fixed number of 600 components, representing large, mid and small capitalization firms across 17 European countries[[2]](#footnote-2). Respectively, the STOXX Asia/Pacific 600 index accounts for the 600 firms of the highest capitalization in the South-East Asia and Oceania region. Given that momentum returns could simply be the effect of lead-lag relations (Lo and MacKinlay, 1990), based on the under-reaction hypothesis supported by Hong and Stein (1999), we test the ability of individual industry portfolios to predict the Eurostoxx 600, the STOXX Asia/Pacific 600 and the Dow Jones indices.

Although the focus of this paper is the “relative performance” of stocks in the form of price trends, the analysis proceeds a step further and attempts to contribute to other issues as well. An open issue in the relevant literature is whether stock prices momentum and reversals are distinct from the nature of the portfolio (Moskowitz and Grinblatt, 1999). A common notion in the relevant literature is that certain industries follow a price trend for considerable periods of time, while others do not. The construction of international portfolios that supersede market’s restrictions in terms of liquidity, arbitrage limits or individual industry financial information has not been tested before in terms of industry momentum or reversals. Lewellen (2002) and Lesmond et al. (2004) argue that momentum is a pervasive feature of U.S. returns; however, it cannot be attributed solely to firm-specific characteristics.

Another open issue that has not gained significant attention in the literature is the potential presence of a linkage between momentum and return reversals. Certain studies (see among others Moskowitz and Grinblatt, 1999) argue that short-term momentum is typically followed by long-term reversals. The intuition behind this argument is that after a momentum shock, stock prices return to their long-term natural equilibrium (mean-reverted), correcting for this value deviation from its pre-shock value. Nevertheless, in a recent study, Conrad and Yavuz (2017) criticize this stylized fact in the literature; they clearly document that mean-reversion disappears if we control for book-to-market, size and liquidity factors. Using out international portfolios as a test bed we can test for the presence of a “natural-equilibrium state” in terms of stocks or industry portfolios.

The analysis shows that positive returns from a contrarian strategy in the European area are short-termed and could mainly be attributed to firms’ rather than to industries’ characteristics. We reach to similar conclusions for the Asia/Pacific region, while we do not detect price reversals in the U.S. market. Contrarian returns on international portfolio formation for the European and the Asia/Pacific region are absent from the relevant literature, while the findings on the U.S. market contradict those to Hammed and Mian (2015), due to a different sample selection. Moreover, the analysis highlights that momentum is a pervasive characteristic of industrial portfolios, while it is more apparent in small capitalized stocks for the European and Asia/Pacific regions. The US market exhibits positive momentum returns only episodically, due to the fast response of traders in the U.S. market that arbitrages all momentum away (Dolvin and Foltice, 2017; Bhattacharya et al., 2015). The results are robust examining the entire sample (2000-2017) or a reduced sample (2000-2007) that compensates for the significant economic events in the post-2007 period.

Regarding the connection of momentum to price reversals, the analysis does not find evidence that momentum and reversal patterns are linked, as in Conrad and Yavuz (2017). If momentum and reversal were linked, then it should had expected portfolios to display interchanging momentum and reversal patterns, while stronger momentum should had been followed by stronger reversals. To test this assumption, it focuses on the industries with the highest momentum and reversal returns on the intra-industry level, since only intra-industry portfolios exhibit positive contrarian profits. One should expect that if momentum and reversal patterns were linked, the profitable industry portfolios would be the same in both investment strategies. By contrast, it finds that these portfolios are different. Nevertheless, the disjoint nature of the two phenomena is not motivated by the book-to-market ratio, but by the differentiation of the industry portfolios across various markets and different financial factors.

Finally, the findings provide evidence that certain European industry portfolios lead the market (Hong et al., 2007), giving rise to the argument that momentum could be attributed to the underreaction of traders to industry-related news. The empirical analysis for the U.S. and the Asian/Pacific markets leads to similar conclusions. Thus, it reaches inconclusive evidence of a lead-lag relation, since the industry portfolios yielding higher momentum returns do not consistently predict the market. However, a profitable investment strategy based on industry portfolios’ predictive ability gains a significant 9.53% annualized cumulative return for the European markets, 7.52% for the Asian/Pacific markets and 14.30% for the U.S.

The remainder of the article is organized as follows. Section 2 describes the data and their descriptive statistics, while Section 3 analyzes the contrarian strategy. Section 4 reports the momentum strategy and Section 5 explores the market predictability. Finally, Section 6 concludes.

1. **The data**

The dataset comes from the Thompson Reuters *Worldscope* database, where it compiles end-of-month prices for 9,521 stocks on 14 European stock markets, 14,691 stocks on 12 Asia/Pacific stock markets and 5,479 prices on the New York Stock Exchange (NYSE) and the NASDAQ stock markets. The sample spans the period January 2000-June 2017. To make stock prices comparable, all values are expressed in U.S. dollars. Especially for the European stock markets, the sample includes both Eurozone and non-Eurozone[[3]](#footnote-3) markets to avoid serial correlation in the construction of the industry portfolios and provide a sample that is adequately differentiated.

As we observe from Table 1, the German stock market accounts for almost one third of the total number of stocks in the European region, followed by the U.K. and the French stock markets. Additively, the aforementioned stock markets account for almost half of the number of stocks. In the Asia/Pacific region, the Chinese market accounts for almost one third of the total number of stocks, followed by Japan, Australia and Hong Kong, while the NYSE and NASDAQ are represented with approximately the same number of stocks. Given that the analysis surpasses the national/market bounds, it needs a market index that expresses the entire region characteristics. Under this perspective, it considers the Eurostoxx 600 index[[4]](#footnote-4) as an overall proxy to European markets performance, the STOXX Asia/Pacific 600 index[[5]](#footnote-5) for the Asia/Pacific market, and the Dow Jones Industrial Index for the U.S. market, respectively[[6]](#footnote-6). The reported number of stocks by country in Table 1 is the number of active stocks at the end of our sample.

**<Insert Table 1 here>**

Panel A of Table 2 reports the Pearson’s correlation coefficients for the Eurostoxx 600 index with the national stock market indices of the European sample. The correlation coefficients are positive and statistically significant, apart from the stock market of Cyprus, which is a market of very small capitalization. Interestingly, the correlation coefficient for Germany and France are both above 0.90, while for the U.K. is 0.58. The correlation coefficients for the Asia/Pacific sample reported in Panel B of Table 2 are all positive and above 0.60. The same applies for the correlation of Dow Jones Industrial with NASDAQ composite and S&P 500 index. Thus, we conclude that the three selected indices approximate sufficiently accurate the stock markets in the respective regions.

**<Insert Table 2 here>**

In order to measure momentum and reversals between and within sectors, the analysis uses the *Worldscope* categorization and generates 29 value-weighted industry portfolios for the European sample, 25 value-weighted industry portfolios for the Asian and 13 portfolios for the U.S. sample. The different number of industry portfolios across regions should be attributed to the differences between the *Worldscope* classification system and the various national classification systems, that provide a different number of industrial sectors in *Worldscope* per country.

The *Worldscope* database follows the SIC (Standard Industrial Classification) categorization for stocks, separating them to sectors and industries according to their business activity. Companies that do not fall within one of the industries classifications are reported under the group *Miscellaneous*. Holding companies are assigned to the *Diversified* group. Naturally, all classification groups have their drawbacks, since establishment-based classification systems, such as the Global Industry Classification Standard (GICS) does not reflect the impact on the market, while the *Worldscope* categorization is prone to shifting firms to different sectors over time. Nevertheless, the magnitude of the sample and the differentiation between alternate markets compensates for any misclassifications, given that each firm is only a tiny fraction of the industry sector.

All returns are logarithmic returns in excess of the one-month Euribor for the European sample and the one-month Libor rate for the Asia/Pacific and the U.S. sample, respectively. Special care is taken so that each company participating to the creation of an industrial portfolio is not delisted during the previous 12 months. The descriptive statistics on the industries’ portfolios are reported in the Appendix.

1. **Market reversals**

The presence of short-term reversals is well documented in the literature and several explanations have been proposed (Kariofyllas et al., 2017; Hammed and Mian, 2015, Campbell et al., 1993). Mainly being documented at the short-term, positive returns from a contrarian strategy that builds on reversals could originate from either within or across industries portfolios. In contrast, negative contrarian returns suggest trend following (momentum) and are consistent with underreaction. Following Hammed and Mian (2014) and Da *et al.* (2011), the analysis decomposes the unconditional contrarian portfolios into their intra- and inter-industry components. By intra-industry reversals we mean that we sell the stock (go short) on an industry sector that outperforms the industrial portfolio return in the previous month, while we buy the stock (go long) that performs worse than the industry portfolio in the previous month. By inter-industry reversals we mean that we sell the entire industry portfolio that outperforms the market index (Eurostoxx 600/STOXX Asia-Pacific 600/DJ), while we buy the industry portfolio that underperforms the market index in the previous month. In doing so, we evaluate 1 to 12 months holding periods of the portfolio after its formation to measure short, medium and long-term reversals. The unconditional contrarian portfolio is given by:

(1)

where is a scaling factor, so that the strategy is $1 long the loser stock/industry and $1 short the winner stock/industry, expresses the past returns of the stock *j*, is the industry portfolio’s *i*  return, the number of stocks in the industry *i*, *l* expresses the number of industries in the sample, *n* is the total number of stocks in the sample, is the past return of the market and indicates the holding period of our position. The first term in Equation (1) represents the returns to a strategy that buys stocks that underperform the industry portfolio and sells stocks that outperform the industry average (intra-industry returns), while the second term represents long (short) positions in the industry portfolio, if the industry returns are higher (lower) than the market portfolio in the formation period (inter-industry returns). Given that the analysis uses value-weighted portfolios, the approach is indifferent to stock delisting, changes in the capitalization of a stock (for example new equity) and microcaps dominating the portfolios (Hong and Stein, 1999; Hammed and Stein, 2015).

In Equation (1), we expect intra-industry reversals to be a better measure of liquidity, given the empirical findings of Moskowitz and Grinblatt (1999) who report significant momentum returns to the inter-industry level arising from an under-reaction of traders to public information. Moreover, liquidity issues are more related to stock-level inventories than industry portfolios given the differentiation of our portfolios. Hammed and Mian (2015) also find that the cross-sectional variation of returns for the unconditional strategy are higher than the intra-industry returns (given the volume and price restrictions of each industry), suggesting that intra-industry reversals may be closely related to financial constraints. Intra- and inter-industry profits are described as:

(2)

(3)

respectively, where and . Table 3a reports the annualized cumulative unconditional, inter- and intra-industry returns of the contrarian strategy for the European region, Table 3b for the Asia-Pacific, and Table 3c for the U.S. region, respectively.

**<Insert Table 3a here>**

**<Insert Table 3b here>**

**<Insert Table 3c here>**

As it is observed from Panel A of Table 3a for the European market, apart from the top 20% capitalized industries, all unconditioned contrarian strategies achieve significant positive returns at the one-month holding period, with the portfolio from the lowest capitalization stocks achieving the highest return (1.38%) compared to the use of the entire universe of stocks (0.54%). Northern and Southern markets exhibit similar returns (0.56% and 0.38%), while Eurozone industry portfolios outperform slightly the all-stocks strategy (0.65%). All gains disappear when a holding period is considered longer than one month. Panel B isolates the intra-industry returns of the unconditional contrarian strategy. The intra-industry returns, scaled or not, are all positive and statistically significant at the short-run, with the highest return (1.43%) achieved again at the lowest 20% capitalized industries. When the holding period exceeds the one-month window all intra-industry returns turn negative. In contrast, no statistically significant gains are reported from the contrarian strategy in inter-industry trading (Panel C).

Overall, the driving force of the positive contrarian returns are intra-industry returns, attributed to representativeness and liquidity constraints, since the liquidity hypothesis is more apparent at the firm level (Nagel, 2002; Hammed and Mian, 2015; Chen et al., 2018). Moreover, the negative returns suggest a strong across industry momentum (Moskowitz and Grinblatt, 1999). The scaling factors in panel D indicate that the remaining differences between the unconditional strategy and the intra-industry case for the lowest capitalized industries (column 3), come from the lower cross-sectional dispersion in industry-adjusted returns () and this contributes to the high . Hence, we conclude in favor of the presence of significant short-term reversals of stock returns in the EU markets, stemming from individual stock price reversals as a result to liquidity constraints. The reported results match very closely to those provided by Moskowitz and Grinblatt (1999), Hameed and Mian (2015) and Lewellen (2002), suggesting an overreaction to the stock level and an under-reaction to the sectoral level for European stocks.

The contrarian strategy reaches similar results for the Asia/Pacific markets (reported in Table 3b). The portfolios that exhibit the highest positive short-term profits from the contrarian strategy are the bottom 20% capitalized industries, attributed to intra-industry reversals. The inter-industry returns are either negative of statistically insignificant. The relevant scarce literature on price reversals for the Asia/Pacific stock markets (Wu, 2010; Amin et al., 2013) supports strong short-term momentum followed by long-term price reversals. In contrast, the empirical findings suggest that the profitability of contrarian strategies stems from individual stock movements and not from sectoral characteristics. In other words, traders tend to overreact to news in certain stocks, but underreact to financial information that adheres to the broader situation of the market. We return to this issue later in the paper.

Interestingly, the results of the analysis for the US stock market, reported in Table 3c, are different from the empirical findings of Hameed and Mian (2015, p. 101). We do not detect positive returns for a contrarian strategy, regardless of the use of alternative portfolio formation options based on capitalization, market specific stocks, or the decomposition to within industry (intra) or across-industries (inter) portfolios. Hameed and Mian (2015) detect positive intra-industry returns that dominate the contrarian strategy, regardless of the use of equally-weighted or value-weighted portfolios, to avoid portfolios being dominated by microcaps. This discrepancy between Hameed and Mian (2015) and our findings for the US market should be attributed to the examination of a different time period. While their sample spans the period 1980-2012, the analysis here uses data over the period 2000-2017, where the effect of the 2007 crisis is more intense. Kariofyllas et al. (2017) suggest that the 2007 period contributed to the removal of noise traders, to market participants that rely on historical prices (trend/reversals), and a term coined by Hong and Stein (1999). Moreover, Kariofyllas et al. (2017) argue that the post 2007 period is marked by a shift of traders towards conservatism, an element that is smoothed out in the short post-2007 sample of Hameed and Mian (2015).

In order to control for the 2007 financial crisis, the quantitative easing that took place in most European countries, and the sovereign European crisis of 2010, the analysis estimates the return of all contrarian portfolios on a reduced time window, that is, 2000-2007. The results reported in the Appendix are quantitative similar for the European, the Asia/Pasific, and the U.S. stock markets with those of the entire sample. Figure 1 depicts the intra-industry returns for each industrial portfolio for the lowest 20% capitalized stocks for the one-month holding period in the entire sample, where we detect the highest positive reversals[[7]](#footnote-7).

**<Insert Figure 1 here>**

The strong intra-industry reversals of Real Estate (4.78%), Recreation (2.43%), Metal Product Manufacturers (2.35%) and Financial (2.01%) in the European area (subplot A) achieve positive intra-industry returns and only Automotive (-0.08%), Textile (-0.30%) and Aerospace (-0.61%) exhibit negative intra-industry contrarian returns. For the Asia/Pacific sample (subplot B), Metal Producers (5.35%), Paper (4.84%), Aerospace (3.19%) and Chemicals (2.29%) achieve the highest positive reversal profits, while Oil, Gas and Coal (-2.11%) exhibit negative returns. Nevertheless, the case of the U.S. market is different. The contrarian strategy achieves negative returns for almost all industrial sectors, apart from Consumer Services and Diversified. Hence, the examination of Figure 1 adheres to the mean returns across stocks/industries from the application of a contrarian strategy within industries in Tables 3a, 3b, and 3c.

**4 Market momentum**

**4.1 Momentum analysis**

The negative contrarian strategy returns across industries suggests that returns at the inter-industry level are probably characterized by underreaction as a result of a conservatism bias of investors. Hence, we expect the prevalence of a momentum effect with positive returns of a strategy that follows the trend of stock prices. To elaborate on this finding, we develop a simple momentum trading strategy across industries where we go long (short) on past winners (losers) based on past excess returns. To form our portfolio, we sort all industry portfolios according to their cumulative returns over the past 12 months before the formation time of the portfolio (e.g., t-12 to t-2). We leave a one-month gap between sorting the portfolios and the formation period to avoid autocorrelation and micro-market bid-ask effects (Jegadeesh, 1990).

After arranging all portfolios according to their respective returns, we classify them into five quintile portfolios, where the first quintile represents past losers (industry portfolios with the lowest returns) and the last quintile represents past winners (industry portfolios with the highest returns). We go long on past winners and short on past losers [Winners-minus-Losers (WmL) strategy] and form the value-weighted portfolio that we hold for a period of one to twelve months. Naturally, the relevant literature includes alternative methods in forming a momentum strategy, such as the “consistency criterion” of a stock in producing above the median returns for a period of time (Kariofyllas et al., 2017), the P3-P1 momentum portfolio which is long the top third and short the bottom third of securities ranked on returns (Asnes et al., 2013), constant volatility momentum strategies (Barroso and Santa-Clara, 2015) with the focus shifting on risk and not returns, and various dynamic adjustment strategies that assign different weights on stocks based on their past performance (Daniel and Moskowitz, 2016). Nevertheless, no strategy comes without drawbacks, since each strategy emphasizes on different aspects of a market’s function, according to the researcher’s evaluation scheme. To be consistent with previous studies, we choose the popular WmL strategy to focus explicitly on returns, which has been used extensively in the relevant literature.

The inter-industry momentum returns for 1-, 6- and 12-months holding periods are reported in Tables 4a, 4b and 4c for the European, the Asia/pacific, and the U.S. stock markets, respectively.

**<Insert Table 4a here>**

As we observe for Table 4a for the European region, the WmL strategy across industries achieves significant short-term (10.06%) positive returns when the entire universe of stocks is used in forming our industry portfolios. The bottom 20% capitalized industry portfolios achieve significant positive returns, regardless of the holding period of the portfolio, which is consistent with the literature that detects significant inter-industry momentum returns to the US stock market (Moskowitz and Grinblatt, 1999; Behr *et al.,* 2012). Moreover, as Hong et al. (2007) argue, stocks and sectors of low capitalization often gather less analysts’ coverage than leading sectors, so most investors are characterized by conservatism and underreaction, leading to positive momentum returns. All other portfolio formation options fail to achieve a significant positive return. A closer examination of the returns for the bottom 20% capitalized industry portfolios reveals that almost the entire positive momentum returns originate from the sorting end (selling past losers); a phenomenon attributed to the large fluctuations of the losers in comparison to the winners’ part of the portfolio. Daniel and Moskowitz (2016) document similar performance for the U.S. stock market. When we repeat the analysis on the smaller 2000-2007 sample (reported in the Appendix), the results are quantitatively similar. Thus, momentum at the inter-industry level is a profitable strategy only for the bottom 20% capitalized industries, since smaller stocks (industries) tend to gather less attention and traders underreact to news (Luo et al., 2020).

The analysis of the inter-industry returns for the Asian /Pacific portfolios reach to similar results; the portfolios based on the bottom 20% capitalized industries exhibit significant positive returns that stem from the sorting end of the strategy, while all other portfolio formation options do not reach any significant positive returns. ASEAN industry portfolios are positive and significant only at the monthly horizon. Interestingly, the results from the 2000-2007 sample reject momentum positive returns of the bottom 20% portfolios for horizons longer than 6 months, suggesting a short-term momentum that crashes over time, probably due to the reduced number of observations that leads to sample-specific results. The basic take-away is that momentum is pervasive throughout both samples in the short-run.

**<Insert Table 4b here>**

Extending the work to the US stock market, we obtain no consistently significant positive momentum returns, with positive returns appearing only episodically. This finding is in line with Dolvin and Foltice (2017) and Bhattacharya et al. (2015) who report that momentum profits have disappeared in the period 2000-2017. The existence of positive momentum is only episodical and depends on sample selection and the fact that investors in the US market tend to arbitrage momentum away rapidly, once they discover it. The empirical findings are quantitatively similar to the sub-period 2000-2007.

**<Insert Table 4c here>**

**4.2 Further evaluation on momentum findings**

Next, we further evaluate momentum results of sub-section 4.1. To do so, we follow Lewellen (2002), Lo and MacKinley (1990) and Chen and Hong (2002), who show that the presence of a momentum pattern is followed by statistically significant autocorrelations and cross-correlations between industries. More specifically, they show that negative autocorrelations and cross-correlations are indications of overreaction, while Chen and Hong (2002) argue that positive correlations point towards underreaction. For testing the aforementioned assumptions in Tables 5a, 5b and 5c, we report autocorrelations (diagonal elements) and cross-correlations (off-diagonal elements) for industry portfolios constructed using all stocks[[8]](#footnote-8) for the European, Asia/Pacific, and US region. We exclude zero correlations to enhance table readability.

**<Insert Table 5a here>**

**<Insert Table 5b here>**

**<Insert Table 5c here>**

As in Chen and Hong (2002), all correlations are close to zero, while the mean value of autocorrelation across industries is positive, 0.02. Accordingly, the mean cross-correlation value across columns (predictive portfolio) is also positive, 0.02, and across rows (predicted portfolio) is 0.01. The empirical findings support Barberis et al. (1998) and Hong and Stein (1999) who also find positive industry autocorrelations, that momentum could be attributed to underreaction. However, this finding should be read in cautious, given the small value of the correlation coefficient (Chen and Hong, 2002) and its apparent statistical insignificance.

**4.3 Momentum on stock level**

To conclude the analysis on momentum trading, we estimate whether a momentum pattern is present at the stock level rather than the industry level, which is the focus of sub-section 4.1. Tables 6a, 6b and 6c present results for momentum patterns on the individual stock level, eliminating the industry classification assumption during portfolio construction for the European, Asia/Pacific and U.S. region, respectively. This is also equivalent to the unconditional returns of the contrarian strategy reported in Tables 3a, 3b and 3c. In order for a stock to be included in the momentum strategy, it should be traded actively during the 12 months prior to the formation of the portfolio.

**<Insert Table 6a here>**

The results in Table 6a for the European region exhibit significant positive returns for all portfolios only for the short one-month horizon, while in longer holding periods, only the bottom 20% portfolios exhibit positive returns. This finding is consistent with the findings in Table 4a, suggesting than momentum returns on the unconditional level originate from across industry momentum effects and mainly for the bottom 20% capitalized stocks. In comparison to the inter-industry results presented in Table 4a, we argue that momentum is present at the industry level, rather than the stock level. This finding corroborates with that of Moskowitz and Grinblatt (1999) who report that industry momentum strategies are more profitable than individual stock momentum strategies for the US stock market, spanning the period July 1965 to July 1995. The findings are similar for the Asia/Pacific portfolios. Significant positive returns appear with consistency only at the bottom 20% capitalized stocks, with all profits stemming from the sorting part of the portfolio. The momentum strategy for the U.S. region (Tables 6c) exhibits positive momentum returns only for the short one-month horizon, in line with the findings of Bhattacharya et al. (2015) that all momentum profits are rapidly smoothed out. The results on the shorter 2000-2007 period (reported in the Appendix) reach similar conclusions.

**<Insert Table 6b here>**

**<Insert Table 6c here>**

Finally, the analysis rejects another stylized puzzle in the financial literature. Conrad and Yavuz (2016) document a succession of short-term momentum with long-term price reversals in the US market. The empirical findings do not support such a notion for either of the three examined regions. In fact, they provide evidence on short-term intra-industry reversals and short-term inter-industry momentum, at the same time. Hence, we argue that momentum and price reversals are two disjointed phenomena that appear into different parts of the market. This study is the first to contradict the findings of Conrad and Yavuz (2016) for the U.S. market, while in parallel provide pervasive results on the examination of international stock markets.

**5 Market predictability and economic significance**

**5.1 Market predictability**

As noted above, a frequently provided explanation for the presence of inter-industry momentum returns (reported in Tables 5a, 5b and 5c) is underreaction, attributed to the asymmetric diffusion of information across industrial sectors phenomenon (Hong and Stein, 1999 and Hong *et al.*, 2007); a representative investor updates on industry news about market fundamentals slower than a Bayesian would do. Thus, in the presence of asymmetric information diffusion, we expect that some industries will act as predictors to market’s future realizations (i.e., the market/region index). If this is the case, then we can argue that the success of the momentum industries can actually be attributed to an asymmetry in the diffusion of information across industries.

In order to examine the diffusion hypothesis across industries that shapes conservatism (momentum trading) and representativeness (contrarian trading), we test whether industry portfolios can forecast the excess returns of the market. In doing so, we select the Eurostoxx 600 / STOXX Asia/Pacific 600 and Dow Jones Industrial for the European, Asia/Pacific and the US region as dependent variables and evaluate the following model using all industry portfolios jointly as independent variables:

(4)

where are market index returns, is a constant term, is a vector of coefficients for the lagged industry portfolios excess returns **,** is avector of coefficients for lagged control variables, the lag order, and is the error term. The control variables for the European market (descriptive statistics are reported in the Appendix) include: a) the lagged market returns, so as to be certain that the profitability of the industrial portfolios is not an artifact of market autocorrelation, b) lagged market volatility, so as to ensure that we forecast market returns and not market volatility (Hong *et al.*, 2007), c) lagged inflation (Fama and Schwert, 1977), d) the lagged industrial production index, so as to isolate macroeconomic fluctuations in the financial market, and e) a binary variable that captures the bear/bull state of the market. Kole and van Dijk (2017), among others, claim that a financial market that is in the state of generating positive (bear) or negative (bull) returns over prolonged time periods implies different investment opportunities between the two regimes.

Instead of jointly including all industry portfolios in Equation (4), we could examine each industry separately. The cost of including all industries is that the standard errors are larger, since we have a limited number of observations (210). In contrast, since all industrial returns are contemporaneously correlated, we do not worry about any omitted variable bias. Notably, the empirical findings suggest that both approaches produce quantitatively similar results[[9]](#footnote-9).

For estimating the state of the economy in order to be used as regressor in the forecasting estimation, we apply the mechanical approach of Bry and Boschan (1971) turning points dating rules (a set of rules) to identify turning points in market indices, i.e. peaks and troughs. After the identification of all turning points, bull-market periods are defined as the periods from a trough to the next peak, while bear markets are the periods following a peak to the next trough. The dating rule states that if an observation deviates more than 10% of the value of its neighboring observations, then it can be considered as a turning point. Additionally, the period of each state should be at least 6 months and a complete cycle (peak to peak or trough to trough) should be more than 15 months. Figure 2 depicts the identified states of our approach, as well as that of Kole and van Dijk (2017), who treat the state of the market as an unobservable two-state Markov chain process, for the Eurostoxx 600 index[[10]](#footnote-10). As we observe, the dating rule adheres more closely to the true state of the market compared to the Markov two-regime approach.

**<Insert Figure 2 here>**

Table 7a depicts the results from the estimation of model (4) for the European region.

**<Insert Table 7a here>**

In the short one-month holding period using the entire sample of stocks, five sectors, i.e., aerospace, automobile, diversified, oil and miscellaneous, are statistically significant at 5%, indicating the presence of a delay in the diffusion of information between sectors of the European stock markets. In fact, the industry portfolios are value-weighted and include more than one stock market and countries. Thus, we expect to find similar discrepancies across industrial portfolios. The coefficients of both market volatility and the state of the market are also statistically significant, so we do detect significant effects of volatility and past returns; effects that we isolate and control for in our model. Moreover, the state of the market determines the actual returns of each sector, regardless of microstructure effects of the market during boom periods. Despite that the results are horizon dependent (since in higher lag orders the significant coefficients are different), there exist significant coefficients in all lag orders. The segregation of stocks according to their capitalization or spatial orientation, provides similar results. Across all horizons, we detect statistically significant coefficients, suggesting the delay in the diffusion of information across sectors. The examination of the Asian/Pacific portfolios reported in Table 7b and of the U.S. market portfolios in Table 7c suggests that the presence of industrial sectors that forecast the market is only episodical. Thus, momentum returns between industries are not fully explained by the diffusion in the information across sectors hypothesis of Hong and Stein (1999) and Hong et al. (2007) and should be attributed to a conservatism bias.

**<Insert Table 7b here>**

**<Insert Table 7c here>**

**5.2 Economic significance**

While the statistical significance of a forecasting model provides insights in the structure of the model and the existence of causal relationship between variables, the ‘true’ merit for a practitioner (and the return-based analysis of this paper) lies with the economic significance of the model in shaping profitable trading strategies. In this vein, we evaluate the economic significance of industrial portfolios in an out-of-sample forecasting exercise. Under a simplistic scenario of no trading costs, a trader forecasts the excess return of the market index (Eurostoxx 600 / STOXX Asia/Pacific 600 / Dow Jones) for a fixed period ahead, based on model (4) and on a 10-year rolling window. In this manner, we get out-of-sample forecasts for the last 88 months that have not been used during the training phase. In each period, the trader invests in the index if she predicts positive excess returns, or alternatively invests in the monthly Euribor (Libor) interest rate, considered as the risk-free rate. We compare the trading strategy with the popular Buy and Hold strategy of going long to the index and the naive Random Walk (RW) strategy (the best forecast about the future value is the present one). Table 8 reports the annualized cumulative returns and the Sharpe ratios across all models and holding periods of the aforementioned momentum strategy.

**<Insert Table 8 here>**

Starting from the European region, the trading strategy outperforms both the naïve RW and the Buy and Hold strategy in the one-month holding period for all portfolio formation options (i.e., spatial, capitalization or eurozone). While in longer holding periods the proposed strategy mainly outperforms the random walk and the buy and hold strategy, the reported returns are not statistically significant. The random walk and the buy and hold strategy yield returns that are not statistically different from zero. All portfolios exceed the one-month Euribor rate, which is considered as the risk-free rate. Shifting our focus to the Asia/Pacific portfolios, both the buy and hold and the random walk portfolios are insignificant, as well as most of the portfolios of the proposed strategy. Thus, while all portfolios outperform the risk-free rate, the trading strategy that allocates the portfolio between the market and the risk-free rate outperforms the one-month Libor, but not better than simply holding the market. Finally, for the US market, the proposed re-allocation strategy outperforms the buy and hold strategy and the random walk option, only at the short one-month ahead horizon. All portfolios produce higher returns than the risk-free rate (one-month ahead Libor), but holding the market yields higher returns in the long-run.

Overall, we do not find evidence that momentum returns should be attributed to an information diffusion delay phenomenon across sectors, given that some industries can forecast the market better than others, but only episodically. The proposed asset reallocation strategy achieves high returns only in the short-run.

Conclusion

The presence and the origins of momentum and reversal patterns are still a debatable issue. Explanations vary between different behavioural biases, such as the underreaction or overaction to firm-specific news due to conservatism or representativeness bias (Barberis et al., 1998), cross-sectional differences in expected returns (Conrad and Kaul, 1998), or earnings momentum (Chan et al., 1997). The empirical verification is still inconclusive, as the empirical results showed that behavioural models cannot explain a significant component of momentum (Lewellen, 2002).

This paper contributes to the literature by extensively testing the presence of momentum and reversal portfolios in an international dataset including the most of European, Asian and US markets; the constructed industry portfolios are thus well diversified. The results document that reversals are significant only for the one-month holding period, while they are mainly driven by the bottom 20% capitalized industry portfolios and appear at the individual stocks level. This gives rise to the argument of Hammed and Mian (2015) that the driving force of reversals is liquidity.

We also document that momentum profits are apparent only on the industry level, while smaller firms gain higher momentum profits. Thus, we examine whether this momentum finding is consistent with the ‘gradual diffusion of information’ hypothesis of Hong and Stein (1999). The correlation analysis of momentum profits leads to irrelevant results, while only a small fraction of industry portfolios can predict the market. However, these results should be read with caution. One would expect that industry portfolios with higher momentum returns could also lead the market if the ‘gradual diffusion of information’ hypothesis would hold. The results do not point to that direction. They hold for different time periods and portfolio formation options. Finally, we show that momentum and reversal patterns are not linked; the continuum of short-term momentum with long-term price reversal either at the individual stock, or the industry level reported in the literature, is not verified to any of the aggregate markets examined.

Overall, the examination of international portfolios extends the empirical findings on national stock markets, suggesting the pervasive presence of price patterns that should be attributed to behavioral biases and risk measuring factors. The analysis corroborates to the individual market literature, arguing that previous empirical findings on price patterns are not the result of an elaborate data mining process, but survive the extended international framework.

**References**

Amini, S., Gebka, B., Hudson, R. and Keasey, K. 2013. A review of the international literature on the short-term predictability of stock prices conditional on large prior price changes: Microstructure, behavioral and risk related explanations. International Review of Financial Analysis, 26, 1-17.

Asness, C.S., Moskowitz, T.J., Pedersen, L.H., 2013. Value and momentum everywhere. The Journal of Finance 58, 929-985.

Badreddine, S., Galariotis, E.C. and Holmes, P., 2012. The relevance of information and trading costs in explaining momentum profits: Evidence from optioned and non-optioned stocks. Journal of International Financial Markets, Institutions and Money, 22, 589-608.

Badreddine, S., Galariotis, E.C. and Holmes, P., 2012. The relevance of information and trading costs in explaining momentum profits: Evidence from optioned and non-optioned stocks. Journal of International Financial Markets, Institutions and Money, 22, 589-608.

Barberis, N., Shleifer, A., Vishny, R., 1998. A model of investor sentiment. The Journal of Financial Economics, 49, 307-343.

Barberis, N., Shleifer, A., Vishny, R., 1998. A model of investor sentiment. The Journal of Financial Economics, 49, 307-343.

Barroso, P., Santa-Clara, P., 2015. Momentum has its moments. Journal of Financial Economics 116, 111-120.

Behr P., Guetler A., and Truebenbach F. 2012. Using industry momentum to improve Portfolio Performance. Journal of Banking and Finance, 36(5), 1414-1423.

Behr P., Guetler A., and Truebenbach F. 2012. Using industry momentum to improve Portfolio Performance. Journal of Banking and Finance, 36(5), 1414-1423.

Bhattacharya, D., Li, W. and Sonaer, G. 217. Has momentum lost its momentum? Review of Quantitative Finance and Accounting, 48, 191–218.

Bry, G., and Boschan C. 1971. Cyclical Analysis of Time Series: Procedures and Computer Programs. New York: National Bureau of Economic Research.

Bry, G., and Boschan C. 1971. Cyclical Analysis of Time Series: Procedures and Computer Programs. New York: National Bureau of Economic Research.

Campbell, J.Y., Grossman, S.J. and Wang, J., 1993. Trading volume and serial correlation in stock returns. The Quarterly Journal of Economics, 108, 905-939.

Chan, L., Jegadeesh, N., Lakonishok, J., 1997. Momentum strategies. Journal of Finance 51,1681-1713.

Chen, J. and Hong, H., 2002. Discussion of “Momentum and autocorrelation in stock returns”. The Review of Financial Studies, 15, 565-574.

Chen, Q. Hua, H and Jiang Y. 2018. Contrarian strategy and herding behaviour in the Chinese stock market, The European Journal of Finance, 24,1552-1568.

Conrad, J. and Kaul, G., 1998. An anatomy of trading strategies. The Review of Financial Studies, 11(3), 489-519.

Conrad, J. and Yavuz M.D. 2017. Momentum and Reversal: Does What Goes Up Always Come Down? Review of Finance, 21, 555-581.

Da, Z., Q. Liu and E. Schaumburg. 2011. Decomposing the short-term return reversal. Federal Reserve Bank of New York Staff Reports, No. 513.

Daniel K. and Moskowitz T. 2016. Momentum crashes. Journal of Financial Economics, 122, 221-247.

Dolvin, S., and Foltice, B. 2017. Where Has the Trend Gone? An Update on Momentum Returns in the U.S. Stock Market. The Journal of Wealth Management, 20, 29-40.

Fama, E.F. and French, K.R., 1996. Multifactor explanations of asset pricing anomalies. The Journal of Finance, 51, 55-84.

Fama, E.F. and Schwert, G.W., 1977. Asset returns and inflation. Journal of financial economics, 5, 115-146.

Gupta, K., Locke, S. and Scrimgeour, F., 2010. International comparison of returns from conventional, industrial and 52-week high momentum strategies. Journal of International Financial Markets, Institutions and Money, 20, 423-435.

Hameed A. and Mian G.M. 2014 Industries and Stock Return Reversals. Journal of Financial and Quantitative Analysis, 50, 89-117.

Hong, H. and Stein, J.C., 1999. A unified theory of under-reaction, momentum trading, and overreaction in asset markets. The Journal of Finance, 54, 2143-2184.

Hong, H., Torous, W. and Valkanov, R., 2007. Do industries lead stock markets? Journal of Financial Economics, 83, 367-396.

Jegadeesh, N. and Titman S., 1993. Returns to buying winners and selling losers: Implications for stock market efficiency. Journal of Finance, 48, 65-91.

Jegadeesh, N., 1990. Evidence of Predictable Behavior in Security Returns. Journal of Finance, 45, 881-898.

Kole, E. and Dijk, D.V., 2017. How to Identify and Forecast Bull and Bear Markets? Journal of Applied Econometrics, 32, 120-139.

Lehmann, B.N., 1990. Fads, martingales, and market efficiency. The Quarterly Journal of Economics, 105, 1-28.

Lesmond, D.A., Schill, M.J. and Zhou, C., 2004. The illusory nature of momentum profits. Journal of financial economics, 71, 349-380.

Lewellen J., 2002. Momentum and autocorrelation in stock returns. The Review of Financial Studies. 15, 533-564.

Lo, A., and A. C. MacKinlay, 1990, “When Are Contrarian Profits Due to Stock Market Overreaction?” Review of Financial Studies, 3, 175-205.

Moskowitz, T. J., and M. Grinblatt. 1999. Do industries explain momentum? Journal of Finance, 54, 1249-1290.

Moskowitz, T. J., Y. H. Ooi, and L. H. Pedersen 2012. Time series momentum. Journal of Financial Economics, 104, 228-250.

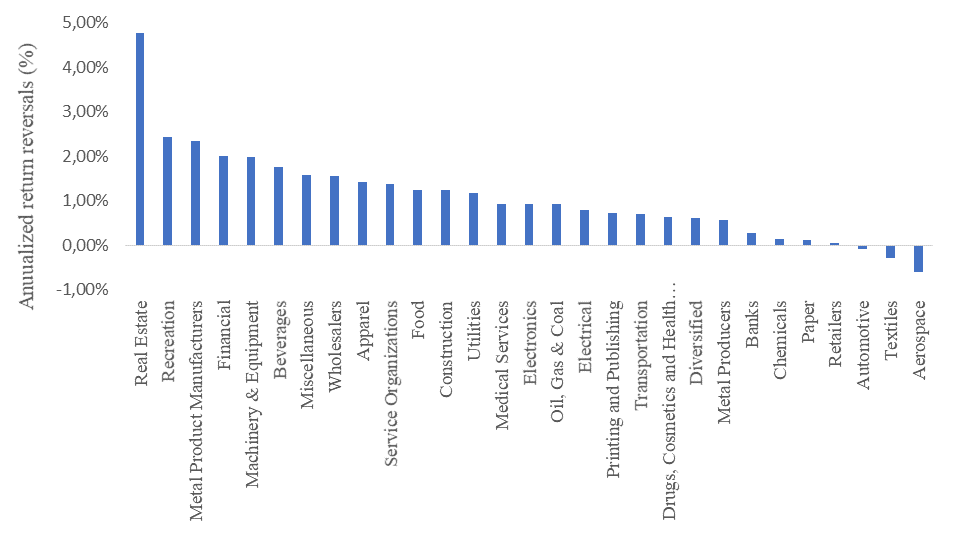
Nagel, S. 2012. Evaporating Liquidity. Review of Financial Studies, 25, 2005-2039.

Sarno, L., Tsiakas, I. and Ulloa B. 2016. What drives international portfolio flows? Journal of International Money and Finance, 60, 53-72.

Vayanos D, Woolley P., 2013. An institutional theory of momentum and reversal. The Review of Financial Studies. 26, 1087-1145.

Wu, Y., 2010. Momentum trading, mean reversal and overreaction in Chinese stock market. Review of Quantitative Finance and Accounting, 37, 301-323.

Subplot A: European stock markets



Subplot B: Asian / Pacific stock markets

Subplot C: U.S. stock market

Fig. 1. The figure depicts monthly returns on the intra-industry reversal strategy for each of the industry portfolios, spanning the period March 2010–June 2017, according to the returns of the portfolio for the previous month.

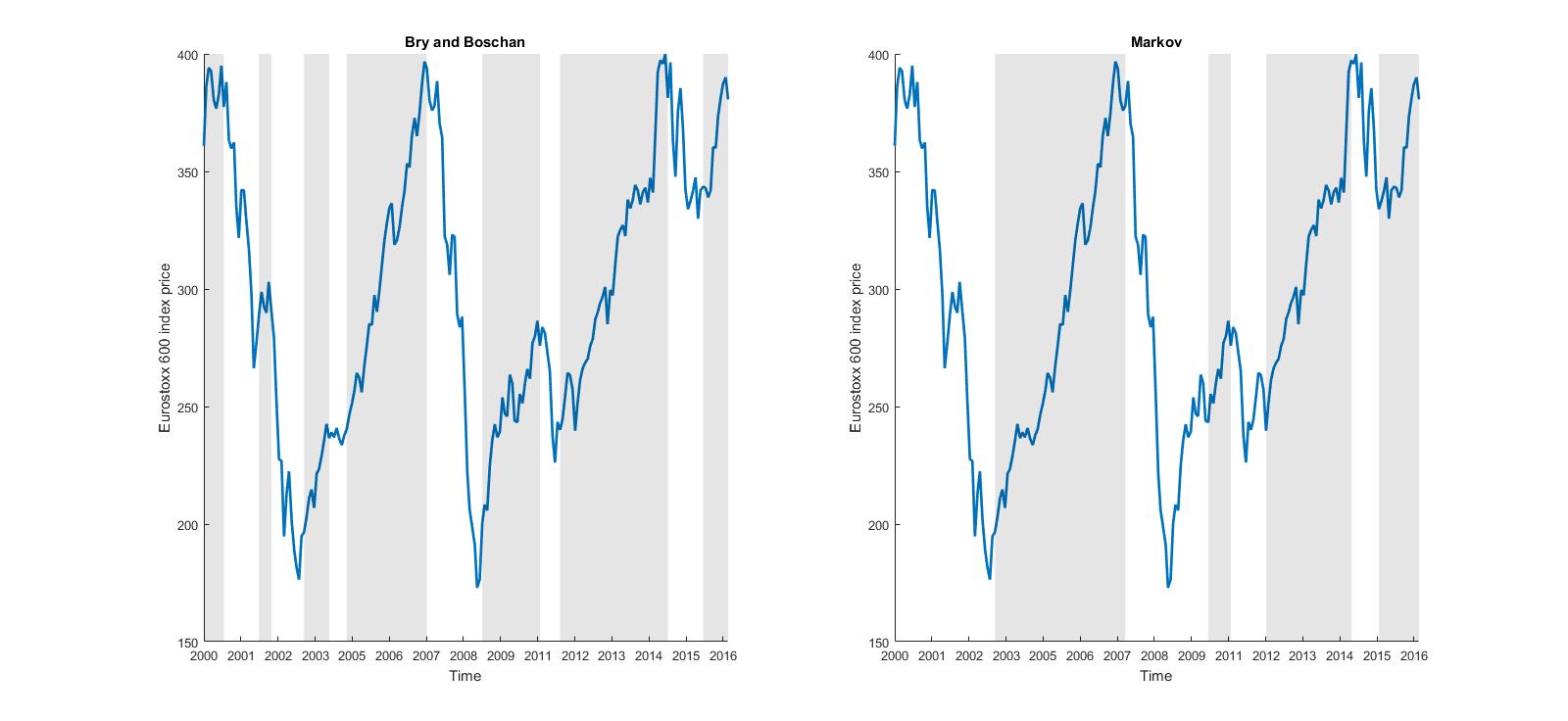


Fig. 2. Identified bear and bull states of the Eurostoxx 600 index. The left subplot depicts the identified states according to the Bry and Boschan (1971) algorithm, while the right subplot depicts the identified states according to a Markov Switching model with two regimes. Grey areas denote an upward (bull) state of the index.

**Table 1**

**Number of stocks by country**

This table presents the number of active stocks by national stock market at the end of the sample period. The sample period is January 2000 – June 2017.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | European Stock Markets | | Asian/Pacific Stock Markets | | U.S. Stock Markets | |
|  | Country | Number  of stocks | Country | Number  of stocks | Market | Number  of stocks |
| 1 | Germany | 3,145 | China | 3,245 | NASDAQ | 2,947 |
| 2 | U. K | 1,354 | Japan | 2,852 | NYSE | 2,532 |
| 3 | France | 1,098 | Australia | 1,800 |  |  |
| 4 | Sweden | 985 | Hong Kong | 1,754 |  |  |
| 5 | Italy | 585 | South Korea | 1,190 |  |  |
| 6 | Norway | 421 | Taiwan | 920 |  |  |
| 7 | Spain | 404 | Malaysia | 786 |  |  |
| 8 | Greece | 307 | Thailand | 711 |  |  |
| 9 | Finland | 295 | Indonesia | 542 |  |  |
| 10 | Belgium | 274 | Singapore | 491 |  |  |
| 11 | Denmark | 251 | Philippines | 273 |  |  |
| 12 | Austria | 228 | New Zealand | 127 |  |  |
| 13 | Portugal | 98 |  |  |  |  |
| 14 | Cyprus | 76 |  |  |  |  |
|  | Total | 9,521 | Total | 14,691 |  | 5,479 |

**Table 2**

**Pearson’s correlation coefficient between market index and the main stock market indices.**

This table presents the Pearson’s correlation coefficient between the Eurostoxx 600 / STOXX Asia/Pacific 600 and Dow Jones Industrial with the individual stock market indices. The sample period is January 2000 – June 2017. The t-statistics are reported in parentheses.

|  |  |  |  |
| --- | --- | --- | --- |
| Country | Pearson’s correlation | Country | Pearson’s correlation |
| *Panel A: European stock markets* | | | |
| Austria | 0.73  (15.19) | Greece | 0.48  (7.78) |
| Belgium | 0.84  (22.12) | Italy | 0.86  (24.26) |
| Cyprus | -0.37  (-22.79) | U.K. | 0.58  (43.33) |
| Denmark | 0.39  (28.22) | Norway | 0.56  (22.45) |
| Finland | 0.42  (6.76) | Portugal | 0.72  (14.76) |
| France | 0.96  (46.44) | Spain | 0.81  (19.57) |
| Germany | 0.92  (33.29) | Sweden | 0.83  (9.71) |
| *Panel B: Asian/Pacific stock markets* | | | |
| Australia | 0.89  (26.85) | New Zealand | 0.72  (14.54) |
| China | 0.61  (10.93) | Philippines | 0.66  (12.29) |
| Hong Kong | 0.85  (22.74) | Singapore | 0.86  (23.85) |
| Indonesia | 0.62  (11.09) | South Korea | 0.74  (15.23) |
| Japan | 0.75  (15.90) | Taiwan | 0.70  (13.67) |
| Malaysia | 0.62  (11.09) | Thailand | 0.63  (11.46) |
| *Panel C: U.S. stock market* | | | |
| NASDAQ | 0.95 | S&P 500 | 0.97 |
| composite | (25.96) |  | (53.57) |

**Table 3a: Contrarian strategy and its decomposition for EU stock markets**

This table reports the annualized unconditional reversal strategy (π) cumulative returns and its decomposition into intra-industry () and inter-industry () reversal return components, as depicted in Equation (1), , where ,, and are the scaling factors for the unconditional, intra-industry, and inter-industry reversal strategies, so that the portfolio weights add to $1 long and $1 short in the respective strategies. All returns are percentages, while the reported returns span the period March, 2010 to June, 2017. Statistically significant returns at the 5% level of significance based on Newey-West robust errors are noted with an asterisk.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Holding horizon | All industry portfolios    (1) | Industry portfolios based on top 20% capitalized industries    (2) | | Industry portfolios based on bottom 20% capitalized industries    (3) | North countries industry portfolios    (4) | South countries industry portfolios    (5) | Eurozone industry portfolios  (6) |
| *Panel A: Unconditional reversal* | | | |  | | | | |
|  | *1* | 0.54\* | 0.03 | | 1.38\* | 0.56\* | 0.38\* | 0.65\* |
| *6* | -0.07 | 0.01 | | -0.11 | -0.06 | -0.12 | 0.01 |
| *9* | -0.06 | -0.08 | | -0.07 | -0.10\* | -0.01 | -0.09 |
| *12* | -0.16\* | -0.07 | | -0.14 | -0.15\* | -0.25\* | -0.06 |
| *Panel B: Intra-industry reversal* | | | |  | | | | |
|  | *1* | 0.54\* | 0.06\* | | 1.43\* | 0.56\* | 0.44\* | 0.64\* |
| *6* | -0.10\* | -0.04 | | -0.05 | -0.10\* | -0.06 | -0.06 |
| *9* | -0.05\* | -0.07\* | | -0.03 | -0.08\* | 0.00 | -0.02 |
| *12* | -0.14\* | -0.06 | | -0.04 | -0.13\* | -0.24\* | -0.11\* |
|  | *1* | 0.56\* | 0.06 | | 1.43\* | 0.59\* | 0.41\* | 0.67\* |
| *6* | -0.10\* | -0.04 | | -0.05 | -0.11\* | -0.03 | -0.06 |
| *9* | -0.05\* | -0.07\* | | -0.03 | -0.09\* | 0.00 | -0.02 |
| *12* | -0.15\* | -0.06 | | -0.04 | -0.14\* | -0.21\* | -0.11\* |
| *Panel C: Inter-industry reversal* | | | |  | | | | |
|  | *1* | 0.00 | 0.00 | | -0.15 | 0.00 | -0.01 | 0.01 |
| *6* | 0.05 | 0.05 | | -0.18 | 0.08 | -0.14 | 0.10 |
| *9* | 0.00 | 0.00 | | -0.12 | 0.01 | -0.02 | -0.06 |
| *12* | -0.03 | -0.03 | | -0.27\* | -0.03 | -0.05 | 0.07 |
|  | *1* | -0.02 | -0.03 | | -0.05 | -0.03 | -0.02 | -0.02 |
| *6* | 0.03 | 0.05 | | -0.06 | 0.05 | -0.09 | 0.07 |
| *9* | -0.01 | -0.01 | | -0.04 | -0.01 | -0.01 | -0.07 |
| *12* | -0.01 | -0.01 | | -0.10\* | -0.01 | -0.04 | 0.05 |
| *Panel D: Scaling factors* | | | |  | | | | |
|  | *1* | 1.00 | 0.99 | | 1.00 | 1.00 | 0.90 | 1.00 |
| *6* | 1.00 | 0.99 | | 1.00 | 1.00 | 0.90 | 1.00 |
| *9* | 1.00 | 0.99 | | 1.00 | 1.00 | 0.90 | 1.00 |
| *12* | 1.00 | 0.98 | | 1.00 | 1.00 | 0.90 | 1.00 |
|  | *1* | 0.62 | 0.97 | | 0.39 | 0.61 | 0.64 | 0.66 |
| *6* | 0.58 | 0.90 | | 0.38 | 0.57 | 0.62 | 0.62 |
| *9* | 0.63 | 0.98 | | 0.38 | 0.63 | 0.66 | 0.68 |
| *12* | 0.62 | 0.95 | | 0.39 | 0.61 | 0.64 | 0.67 |

**Table 3b: Contrarian strategy and its decomposition for the Asia/Pacific stock markets**

This table presents the annualized unconditional reversal strategy (π) cumulative returns and their decomposition into intra-industry () and inter-industry () reversal return components, as depicted in Equation (1), , where ,, and are the scaling factors for the unconditional, intra-industry, and inter-industry reversal strategies, so that the portfolio weights add to $1 long and $1 short in the respective strategies. All returns are in percentages, while the reported returns span the period March 2010 to June 2017. Statistically significant returns at the 5% level of significance based on Newey-West robust errors are denoted with an asterisk.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Holding horizon | All industry portfolios    (1) | Industry portfolios based on top 20% capitalized industries    (2) | | Industry portfolios based on bottom 20% capitalized industries    (3) | Chiang Mai Initiative countries industry portfolios  (4) | Non-Chiang Mai Initiative countries industry portfolios  (5) | ASEAN industry portfolios  (6) |
| *Panel A: Unconditional reversal* | | | |  | | | | |
|  | *1* | 0.23\* | 0.63\* | | 1.07\* | 0.13 | 0.73\* | 0.35\* |
| *6* | -0.20 | -0.09 | | -0.32\* | -0.16 | -0.35\* | -0.12 |
| *9* | -0.01 | 0.06 | | -0.13\* | -0.03 | 0.03 | -0.15\* |
| *12* | -0.11 | -0.04 | | -0.25\* | -0.04 | -0.37\* | -0.08 |
| *Panel B: Intra-industry reversal* | | | |  | | | | |
|  | *1* | 0.30\* | 0.62\* | | 1.11\* | 0.21\* | 0.70\* | 0.45\* |
| *6* | -0.17\* | -0.08 | | -0.17\* | -0.12 | -0.33\* | -0.05 |
| *9* | -0.03 | 0.04 | | -0.06 | -0.05 | -0.01 | -0.06 |
| *12* | -0.07 | 0.02 | | -0.12 | -0.01 | -0.29\* | -0.05 |
|  | *1* | 0.30\* | 0.70\* | | 1.15\* | 0.21\* | 0.69\* | 0.44\* |
| *6* | -0.17\* | -0.08 | | -0.18\* | -0.12 | -0.33\* | -0.05 |
| *9* | -0.03 | 0.05 | | -0.06 | -0.04 | -0.01 | -0.06 |
| *12* | -0.07 | 0.01 | | -0.12 | -0.01 | -0.28\* | -0.06 |
| *Panel C: Inter-industry reversal* | | | |  | | | | |
|  | *1* | -0.09 | -0.10 | | -0.17 | -0.10 | -0.03 | -0.15 |
| *6* | -0.02 | -0.02 | | -0.37\* | -0.05 | 0.01 | -0.12 |
| *9* | -0.04 | -0.02 | | -0.14\* | -0.04 | 0.07 | -0.16 |
| *12* | -0.06 | -0.08 | | -0.43\* | -0.05 | -0.12 | -0.07 |
|  | *1* | -0.06 | -0.07 | | -0.07 | -0.08 | 0.04 | -0.09 |
| *6* | -0.02 | -0.01 | | -0.14\* | -0.04 | -0.02 | -0.07 |
| *9* | 0.02 | 0.01 | | -0.06\* | 0.01 | 0.04 | -0.09 |
| *12* | -0.03 | -0.05 | | -0.13\* | -0.03 | -0.09 | -0.03 |
| *Panel D: Scaling factors* | | | |  | | | | |
|  | *1* | 1.00 | 1.00 | | 1.00 | 1.00 | 0.99 | 0.98 |
| *6* | 1.00 | 1.00 | | 1.00 | 1.00 | 0.99 | 0.98 |
| *9* | 1.00 | 1.00 | | 1.00 | 1.00 | 0.99 | 0.99 |
| *12* | 1.00 | 1.00 | | 1.00 | 1.00 | 0.99 | 0.99 |
|  | *1* | 0.56 | 0.61 | | 0.47 | 0.61 | 0.46 | 0.67 |
| *6* | 0.52 | 0.57 | | 0.41 | 0.56 | 0.44 | 0.60 |
| *9* | 0.52 | 0.56 | | 0.43 | 0.55 | 0.43 | 0.60 |
| *12* | 0.52 | 0.57 | | 0.39 | 0.52 | 0.58 | 0.56 |

**Table 3c: Contrarian strategy and its decomposition for the U.S. stock markets**

This table presents the annualized unconditional reversal strategy (π) cumulative returns and their decomposition into intra-industry () and inter-industry () reversal return components, as depicted in Equation (1), , where ,, and are the scaling factors for the unconditional, intra-industry, and inter-industry reversal strategies, so that the portfolio weights add to $1 long and $1 short in the respective strategies. All returns are in percentages, while the reported returns span the period March 2010 to June 2017. Statistically significant returns at the 5% level of significance based on Newey-West robust errors are denoted with an asterisk.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Holding horizon | All industry portfolios    (1) | Industry portfolios based on top 20% capitalized industries    (2) | | Industry portfolios based on bottom 20% capitalized industries    (3) | NYSE industry portfolios  (4) | NASDAQ industry portfolios  (5) |  |
| *Panel A: Unconditional reversal* | | | |  | | | | |
|  | *1* | -0.31 | -0.28 | | -0.92\* | 0.47 | -0.94\* |  |
| *6* | 0.18 | -0.37\* | | -0.04 | 0.41 | -0.06 |  |
| *9* | -0.03 | 0.14 | | 0.02 | -0.12 | 0.04 |  |
| *12* | -0.05 | -0.23 | | -0.03 | 0.12 | -0.19\* |  |
| *Panel B: Intra-industry reversal* | | | |  | | | | |
|  | *1* | -0.22 | -0.16 | | -0.90\* | 0.54 | -0.75\* |  |
| *6* | 0.20 | -0.32\* | | 0.03 | 0.44 | 0.01 |  |
| *9* | -0.06 | 0.11 | | -0.02 | -0.21 | 0.01 |  |
| *12* | -0.07 | -0.21 | | -0.02 | 0.13 | -0.17\* |  |
|  | *1* | -0.21 | -0.09 | | -0.84\* | 0.56 | -0.76\* |  |
| *6* | 0.21 | -0.34\* | | 0.02 | 0.46 | 0.00 |  |
| *9* | -0.05 | 0.08 | | -0.02 | -0.15 | 0.02 |  |
| *12* | -0.07 | -0.21 | | -0.01 | 0.09 | -0.18\* |  |
| *Panel C: Inter-industry reversal* | | | |  | | | | |
|  | *1* | -0.16\* | -0.24\* | | -0.13\* | -0.13 | -0.25\* |  |
| *6* | -0.06 | -0.07 | | -0.08 | -0.09\* | -0.10 |  |
| *9* | 0.06 | 0.14 | | 0.08 | 0.04 | 0.01 |  |
| *12* | 0.02 | -0.02 | | -0.05 | 0.01 | 0.00 |  |
|  | *1* | -0.10\* | -0.18\* | | -0.09\* | -0.09 | -0.19\* |  |
| *6* | -0.03 | -0.03 | | -0.06\* | -0.05\* | -0.07 |  |
| *9* | 0.02 | 0.06 | | 0.03 | 0.03 | 0.02 |  |
| *12* | 0.02 | -0.02 | | -0.02 | 0.03 | -0.01 |  |
| *Panel D: Scaling factors* | | | |  | | | | |
|  | *1* | 0.97 | 0.98 | | 0.93 | 0.94 | 1.00 |  |
| *6* | 0.97 | 0.98 | | 0.94 | 0.94 | 1.00 |  |
| *9* | 0.97 | 0.98 | | 0.94 | 0.94 | 1.00 |  |
| *12* | 0.97 | 0.98 | | 0.94 | 0.94 | 1.00 |  |
|  | *1* | 0.74 | 0.87 | | 0.69 | 0.87 | 0.90 |  |
| *6* | 0.57 | 0.72 | | 0.56 | 0.66 | 0.81 |  |
| *9* | 0.63 | 0.73 | | 0.61 | 0.75 | 0.74 |  |
| *12* | 0.79 | 0.96 | | 0.77 | 0.93 | 0.80 |  |

**Table 4a: Inter–industry annualized momentum strategy returns for the EU stock markets**

This table presents the inter–industry annualized momentum strategy cumulative returns and their descriptive statistics. The sample spans the period March, 2010 to June, 2017. We sort all industrial value-weighted portfolios according to their cumulative returns over the period t-12 to t-2 months prior the formation period of our portfolio and separate them into 5 quintiles so that the industries with the smallest returns are classified at the bottom quintile and portfolios with the highest returns at the top quintile. In order to avoid ask-bid short term effects (Jegadeesh, 1990) we use a one-month gap between the formation period and the determination of the past stock returns. We go long (buy) the industries in the upper quintile (winners) and short (sell) the industries in the lowest quintile (losers). Our portfolio is re-weighted at each formation period. All returns are in percentage points. Statistically significant returns at the 5% level of significance based on Newey-West robust errors are noted with an asterisk.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Holding horizon | Bottom 20th percentile | Top 20th percentile | Winner minus loser | Number of stocks |
| *Panel A: Industry portfolios based on all stocks* | | | | |
| *1* | 0.75 | 10.81\* | 10.06 (0.16)\* | 2,331 |
| *6* | 4.64 | 4.16 | -0.48 (-0.01) |
| *9* | 4.71 | 6.42 | 1.71 (0.02) |
| *12* | 4.48 | 3.86 | -0.62 (-0.01) |
| *Panel B: Portfolios based on top 20% capitalized industries* | | | | |
| *1* | 1.29 | 9.97\* | 8.68 (0.12) | 510 |
| *6* | 5.19 | 3.72 | -1.47 (-0.02) |
| *9* | 5.79 | 12.80\* | 7.01 (0.10) |
| *12* | 4.02 | 5.31 | 1.29 (0.01) |
| *Panel C: Portfolios based on bottom 20% capitalized industries* | | | | |
| *1* | -41.91\* | -25.85\* | 16.06 (0.08)\* | 298 |
| *6* | -42.45\* | -18.11\* | 24.34 (0.28)\* |
| *9* | -33.83\* | -1.04 | 32.79 (0.44)\* |
| *12* | -30.04\* | -9.65 | 20.39 (0.15)\* |
| *Panel D: North EU countries industry portfolios* | | | | |
| *1* | 7.02 | 3.60 | -3.42 (-0.06) | 1,927 |
| *6* | 5.62 | 6.33 | 0.71 (0.01) |
| *9* | 9.99 | 10.64\* | 0.65 (0.01) |
| *12* | 5.21 | 3.76 | -1.45 (-0.03) |
| *Panel E: South EU countries industry portfolios* | | | | |
| *1* | -7.82 | 3.73 | 11.55 (0.14) | 348 |
| *6* | -4.57 | 6.26 | 10.83 (0.13) |
| *9* | -3.61 | 7.37 | 10.98 (0.16) |
| *12* | -5.73 | 5.33 | 11.06 (0.13) |
| *Panel F: Eurozone industry portfolios* | | | | |
| *1* | -3.35 | -0.31 | 3.04 (0.04) | 1,387 |
| *6* | 2.70 | 3.35 | 0.65 (0.01) |
| *9* | 4.79 | 11.50 | 6.71 (0.08) |
| *12* | 6.74 | -1.49 | -6.23 (-0.11) |

**Table 4b: Inter–industry annualized momentum strategy returns for the Asia/Pacific stock markets**

This table presents the inter–industry annualized momentum strategy cumulative returns and their descriptive statistics. The sample spans the period March 2010 to June 2017. We sort all industrial value-weighted portfolios according to their cumulative returns over the period t-12 to t-2 months prior the formation period of the portfolio and separate them into 5 quintiles, so that the industries with the smallest returns are classified at the bottom quintile and portfolios with the highest returns at the top quintile. In order to avoid ask-bid short term effects (Jegadeesh, 1990), we use a one-month gap between the formation period and the determination of the past stock returns. We go long (buy) the industries in the upper quintile (winners) and short (sell) the industries in the lowest quintile (losers). Our portfolio is re-weighted in each formation period. All returns are in percentages. Statistically significant returns at the 5% level of significance based on Newey-West robust errors are reported with an asterisk. Annualized Sharpe ratios are reported in parenthesis.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Holding horizon | Bottom 20th percentile | Top 20th percentile | Winner minus loser | Number of stocks |
| *Panel A: Industry portfolios based on all stocks* | | | | |
| *1* | 3.03 | 9.13 | 6.10 (0.16) | 3,780 |
| *6* | 3.33 | 7.83 | 4.50 (0.10) |
| *9* | 5.17 | 10.35\* | 5.18 (0.11) |
| *12* | 4.38 | 8.61\* | 4.23 (0.09) |
| *Panel B: Portfolios based on top 20% capitalized industries* | | | | |
| *1* | 3.21 | 7.75 | 4.54 (0.11) | 738 |
| *6* | 4.65 | 7.12 | 2.47 (0.05) |
| *9* | 4.71 | 9.64 | 4.93 (0.09) |
| *12* | 4.54 | 9.93 | 5.39 (0.11) |
| *Panel C: Portfolios based on bottom 20% capitalized industries* | | | | |
| *1* | -18.45\* | -5.53 | 12.92 (0.31)\* | 636 |
| *6* | -15.67\* | -0.48 | 15.19 (0.37)\* |
| *9* | -13.17\* | -2.90 | 10.27 (0.33)\* |
| *12* | -16.26\* | -7.08 | 9.18 (0.30)\* |
| *Panel D: Chiang Mai Initiative* *countries industry portfolios* | | | | |
| *1* | 3.87 | 8.98 | 5.11 (0.12) | 2,914 |
| *6* | 5.28 | 8.02 | 2.74 (0.05) |
| *9* | 5.73 | 9.09 | 3.36 (0.06) |
| *12* | 4.99 | 8.60 | 3.61 (0.07) |
| *Panel E: Non-Chiang Mai Initiative* *countries industry portfolios* | | | | |
| *1* | -4.62 | 5.26 | 9.88 (0.18) | 655 |
| *6* | -1.24 | 5.85 | 7.09 (0.13) |
| *9* | -2.58 | 1.23 | 3.81 (0.07) |
| *12* | 7.88 | 1.25 | -6.63 (-0.14) |
| *Panel F: ASEAN industry portfolios* | | | | |
| *1* | 1.13 | 10.92 | 9.79 (0.25)\* | 593 |
| *6* | 5.23 | 11.17 | 5.94 (0.16) |
| *9* | 6.39 | 12.94 | 6.55 (0.18) |
| *12* | 7.02 | 10.59 | 3.57 (0.09) |

**Table 4c: Inter–industry annualized momentum strategy returns for the U.S. stock markets**

This table presents the inter–industry annualized momentum strategy cumulative returns and their descriptive statistics. The sample spans the period March 2010 to June 2017. We sort all industrial value-weighted portfolios according to their cumulative returns over the period t-12 to t-2 months prior the formation period of the portfolio and separate them into 5 quintiles, so that the industries with the smallest returns are classified at the bottom quintile and portfolios with the highest returns at the top quintile. In order to avoid ask-bid short term effects (Jegadeesh, 1990), we use a one-month gap between the formation period and the determination of the past stock returns. We go long (buy) the industries in the upper quintile (winners) and short (sell) the industries in the lowest quintile (losers). Our portfolio is re-weighted in each formation period. All returns are in percentages. Statistically significant returns at the 5% level of significance based on Newey-West robust errors are reported with an asterisk. Annualized Sharpe ratios are reported in parenthesis.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Holding horizon | Bottom 20th percentile | Top 20th percentile | Winner minus loser | Number of stocks |
| *Panel A: Industry portfolios based on all stocks* | | | | |
| *1* | 6.51 | 11.36\* | 4.85 (0.07) | 1,569 |
| *6* | 5.09 | 15.43\* | 10.34 (0.16)\* |
| *9* | 8.56\* | 12.54\* | 3.98 (0.05) |
| *12* | 4.01 | 14.83\* | 10.82 (0.17) |
| *Panel B: Portfolios based on top 20% capitalized industries* | | | | |
| *1* | 5.75 | 11.84\* | 6.09 (0.09) | 251 |
| *6* | 4.72 | 16.28\* | 11.56 (0.17)\* |
| *9* | 8.80\* | 11.40\* | 2.60 (0.03) |
| *12* | 7.01 | 12.70\* | 5.69 (0.08) |
| *Panel C: Portfolios based on bottom 20% capitalized industries* | | | | |
| *1* | 1.30 | 3.25 | 1.95 (0.04) | 183 |
| *6* | 4.08 | 4.46 | 0.38 (0.01) |
| *9* | 0.21 | 3.17 | 2.96 (0.09) |
| *12* | 1.98 | 5.73 | 3.75 (0.11)\* |
| *Panel D: NYSE industry portfolios* | | | | |
| *1* | 5.77 | 13.51\* | 7.74 (0.15) | 773 |
| *6* | 10.09\* | 9.76\* | -0.33 (-0.02) |
| *9* | 9.84\* | 9.32 | -0.52 (-0.02) |
| *12* | 10.24\* | 6.35 | -3.89 (-0.09) |
| *Panel E: NASDAQ industry portfolios* | | | | |
| *1* | 1.49 | 11.45 | 9.96 (0.10) | 840 |
| *6* | -3.74 | 10.65 | 14.39 (0.14) |
| *9* | 4.32 | 15.44 | 11.12 (0.11) |
| *12* | 4.53 | 13.04 | 8.51 (0.08) |

**Table 5a: Autocorrelation and cross-correlation between industry portfolios (all stocks) for the EU stock markets**

The table reports autocorrelations (diagonal elements) and cross-serial correlations (off diagonal elements) for the value-weighted industry portfolios. Values smaller than 0.01 in absolute value are not reported to improve the readability of the table. The reported correlations are the average of a portfolio’s monthly return and the autocorrelation/ serial correlation over the past 12-month period. The mean autocorrelation over all portfolios is 0.02, the mean serial-correlation across columns (predictive portfolio) is 0.02 and across rows (predicted portfolio) is 0.01. For reasons of table readability, we only report autocorrelations and cross-serial correlations for the first 12 industries. Results are similar for the rest of the industries.

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | -0.01 | -0.02 |  | -0.01 |  |  | 0.02 | -0.03 | -0.01 |  | -0.01 | 0.01 |
|  | -0.01 | -0.01 |  |  | -0.01 | -0.01 |  | -0.01 | 0.01 |  | -0.01 | -0.02 |
|  | -0.01 | 0.01 | 0.01 | 0.01 |  | 0.01 | 0.02 | -0.01 | -0.01 | -0.01 | -0.02 |  |
|  |  | 0.02 |  |  | -0.01 |  | 0.01 | -0.02 | 0.01 |  | -0.03 | -0.02 |
|  | 0.02 | 0.03 | 0.03 | 0.04 | 0.05 | 0.03 | 0.04 | 0.02 | 0.04 | 0.03 | 0.02 | 0.03 |
|  | 0.01 | 0.01 | 0.01 |  | 0.01 | -0.02 | -0.01 | -0.02 |  | -0.02 | -0.01 |  |
|  | 0.02 | 0.02 | 0.04 | 0.01 | 0.01 | 0.02 | 0.03 | -0.01 | -0.03 | 0.02 | -0.01 | 0.02 |
|  | 0.02 | 0.02 | 0.02 | 0.03 | 0.02 | 0.01 | 0.04 |  | 0.03 | 0.02 | 0.01 | 0.01 |
|  | 0.04 | 0.03 | 0.03 | 0.04 | 0.03 |  | 0.03 | 0.02 | 0.03 | 0.03 | 0.02 | 0.01 |
|  | 0.03 | 0.02 | 0.04 | 0.02 | 0.03 | 0.01 | 0.04 |  | 0.02 | 0.02 | 0.01 | 0.02 |
|  | 0.02 | 0.01 | 0.02 | 0.02 | 0.02 | 0.01 | 0.03 | -0.01 | 0.03 | 0.01 |  | 0.01 |
|  | 0.03 | 0.03 | 0.03 | 0.03 | 0.05 | 0.03 | 0.03 | 0.01 | 0.03 | 0.02 | 0.01 | 0.02 |

**Table 5b: Autocorrelation and cross-correlation between industry portfolios (all stocks) for the Asia/Pacific stock markets**

The table reports autocorrelations (diagonal elements) and cross-serial correlations (off diagonal elements) for the value-weighted industry portfolios. Values smaller than 0.01 in absolute value are not reported to improve the readability of the table. The reported correlations are the average of a portfolio’s monthly return and the autocorrelation/ serial correlation over the past 12-month period. The mean autocorrelation over all portfolios is 0.02, the mean serial-correlation across columns (predictive portfolio) is 0.03 and across rows (predicted portfolio) is 0.02. For reasons of table readability, we only report autocorrelations and cross-serial correlations for the first 12 industries. Results are similar for the rest of the industries.

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 0.01 |  |  | 0.05 | 0.02 | -0.01 | 0.02 | 0.01 | 0.02 | 0.02 |  | 0.04 |
|  | 0.01 |  | 0.01 | 0.03 | 0.01 | -0.01 | 0.01 |  | 0.01 |  |  | 0.02 |
|  | 0.01 | 0.01 |  | 0.02 |  | -0.02 |  | 0.01 | 0.01 |  |  | 0.01 |
|  | -0.01 | -0.03 | -0.01 | 0.05 | -0.01 | -0.04 | -0.02 | 0.01 |  | -0.03 | -0.02 | 0.03 |
|  | -0.01 | -0.01 | -0.01 | 0.03 | -0.01 | -0.03 | -0.02 | -0.02 | -0.01 | -0.02 | -0.02 | 0.01 |
|  | 0.01 | 0.01 | 0.01 | 0.03 | 0.02 | -0.01 | 0.02 |  | 0.01 |  |  | 0.02 |
|  |  | 0.01 | 0.01 | 0.03 | 0.01 | -0.02 | 0.01 |  | -0.01 | 0.01 |  | 0.01 |
|  | -0.01 |  |  | 0.01 | -0.01 | -0.03 | -0.02 |  | -0.02 |  | -0.01 |  |
|  | 0.03 |  |  | 0.04 | 0.02 |  | 0.02 | 0.01 | 0.02 | 0.01 | 0.01 | 0.04 |
|  | 0.02 | 0.02 | 0.02 | 0.05 | 0.02 |  | 0.02 |  | 0.01 | 0.02 | 0.01 | 0.03 |
|  | 0.02 | 0.02 |  | 0.02 | 0.01 | -0.02 | 0.01 |  | 0.01 | 0.01 | -0.01 | 0.01 |
|  | -0.01 | -0.03 | -0.02 | 0.03 | -0.02 | -0.04 | -0.03 | -0.01 | -0.01 | -0.03 | -0.04 | 0.01 |

**Table 5c: Autocorrelation and cross-correlation between industry portfolios (all stocks) for the U.S. stock markets**

The table reports autocorrelations (diagonal elements) and cross-serial correlations (off diagonal elements) for the value-weighted industry portfolios. Values smaller than 0.01 in absolute value are not reported to improve the readability of the table. The reported correlations are the average of a portfolio’s monthly return and the autocorrelation/ serial correlation over the past 12-month period. The mean autocorrelation over all portfolios is 0.02, the mean serial-correlation across columns (predictive portfolio) is 0.02 and across rows (predicted portfolio) is 0.01. For reasons of table readability, we only report autocorrelations and cross-serial correlations for the first 12 industries. Results are similar for the rest of the industries.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |
|  |  | 0.01 |  | 0.03 | 0.03 | -0.01 | 0.01 | 0.01 | 0.02 |  | 0.02 | | -0.01 | | -0.03 | |
|  | 0.01 | 0.04 | 0.01 | 0.02 | 0.02 |  | -0.01 | 0.01 | 0.03 | -0.01 | 0.03 | |  | | -0.02 | |
|  | 0.03 | 0.05 | 0.04 | 0.03 | 0.04 | 0.02 |  | 0.03 | 0.02 | 0.02 | 0.02 | | 0.01 | | -0.03 | |
|  | 0.01 | 0.03 |  |  | 0.02 | 0.01 |  | 0.01 | 0.01 |  | 0.03 | |  | | 0.01 | |
|  | -0.01 | 0.03 | -0.02 |  | 0.03 | -0.03 |  |  | 0.02 | -0.02 | 0.02 | | -0.01 | | -0.01 | |
|  | 0.02 | 0.03 | -0.02 | 0.03 | 0.04 | 0.02 | 0.01 | 0.03 | 0.03 | 0.03 | 0.02 | | 0.01 | | -0.05 | |
|  |  | 0.02 | -0.03 |  | 0.01 | -0.02 |  | 0.01 | 0.01 | -0.02 | 0.03 | | -0.01 | | -0.01 | |
|  | -0.03 |  | -0.03 | -0.02 | -0.02 | -0.01 | -0.02 | 0.01 | -0.02 | -0.01 | -0.03 | | -0.04 | | -0.09 | |
|  |  | 0.03 | -0.02 | 0.03 | 0.04 | -0.02 | 0.01 | 0.04 | 0.02 | -0.01 | 0.03 | | -0.01 | |  | |
|  | 0.01 | 0.02 | -0.01 | 0.03 | 0.03 | 0.01 |  | -0.01 | 0.02 | 0.01 | 0.01 | |  | | 0.01 | |
|  | -0.01 | 0.03 | -0.03 | 0.01 |  | -0.02 | -0.02 | 0.01 | 0.02 | -0.03 | 0.02 | | -0.02 | | -0.03 | |
|  | 0.01 | 0.03 |  | 0.02 | 0.04 |  | 0.01 | -0.01 | 0.03 | 0.01 | 0.02 | | -0.01 | |  | |
|  |  | 0.01 | 0.03 |  | 0.03 | -0.04 |  | -0.05 | 0.03 | -0.01 | 0.03 | | 0.01 | | 0.05 | |

**Table 6a: Annualized momentum strategy returns for the EU stock markets**

This table reports the mean excess cumulative returns and the descriptive statistics of a momentum strategy, spanning the period March, 2010 to June, 2017. We sort the stocks of each panel according to their cumulative returns over the period t-12 to t-2 months prior the formation period of the portfolio and separate them into 5 quintiles so that the stocks with the smallest returns are classified at the bottom quintile (1st) and the ones with the highest returns at the top quintile (5th). To avoid the ask-bid short-term effects (Jegadeesh, 1990), we use a one-month gap between the formation period and the determination of the past stock returns. We go long (buy) the stocks in the upper quintile (winners) and short (sell) the stocks in the lowest quintile (losers). The portfolio is re-weighted at the end of the holding period. All returns are in percentage points. Statistically significant returns at the 5% level of significance based on Newey-West robust errors are reported with an asterisk. Annualized Sharpe ratios are reported in parenthesis.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Holding horizon | Bottom 20th percentile | Top 20th percentile | Winner minus loser | Number of stocks |
| *Panel A: All Stocks* | | | | |
| *1* | -11.58 | 9.32\* | 20.90 (0.27)\* | 5,743 |
| *6* | 3.64 | 7.00 | 3.36 (0.04) |
| *9* | 0.18 | 4.43 | 4.25 (0.05) |
| *12* | 0.93 | 1.59 | 0.66 (0.01) |
| *Panel B: Portfolios based on the top 20% capitalized stocks* | | | | |
| *1* | -4.80 | 9.29\* | 14.09 (0.20)\* | 1,310 |
| *6* | 4.61 | 7.56 | 2.95 (0.04) |
| *9* | 5.57 | 3.77 | -1.80 (-0.03) |
| *12* | 3.87 | 2.73 | -1.14 (-0.02) |
| *Panel C: Portfolios based on the bottom 20% capitalized stocks* | | | | |
| *1* | -43.31\* | -9.35 | 33.96 (0.37)\* | 832 |
| *6* | -50.87\* | -2.21 | 48.66 (0.54)\* |
| *9* | -47.09\* | -7.07 | 40.02 (0.48)\* |
| *12* | -34.31\* | -9.84\* | 24.47 (0.29)\* |
| *Panel D: North EU stock markets portfolios* | | | | |
| *1* | -11.60 | 11.98 | 23.58 (0.36)\* | 4,730 |
| *6* | 5.89 | 8.27 | 2.38 (0.03) |
| *9* | 1.36 | 3.64 | 2.28 (0.03) |
| *12* | -1.86 | 4.57 | 6.43 (0.11) |
| *Panel E: South EU stock markets portfolios* | | | | |
| *1* | -19.30 | 2.39 | 21.69 (0.22)\* | 1,003 |
| *6* | -5.51 | -2.24 | 3.27 (0.11) |
| *9* | -13.65 | 0.58 | 14.23 (0.21) |
| *12* | -8.91 | 9.53 | 18.44 (0.29) |
| *Panel F: Eurozone portfolios* | | | | |
| *1* | -9.59 | 9.91 | 19.50 (0.23)\* | 3,597 |
| *6* | 2.39 | 9.49 | 7.10 (0.07) |
| *9* | -0.11 | 4.87 | 4.98 (0.05) |
| *12* | 1.11 | 1.09 | -0.02 (-0.01) |

**Table 6b: Annualized momentum strategy returns for the Asia/Pacific stock markets**

This table reports the mean excess cumulative returns and the descriptive statistics of a momentum strategy, spanning the period March, 2010 to June, 2017. We sort the stocks of each panel according to their cumulative returns over the period t-12 to t-2 months prior the formation period of the portfolio and separate them into 5 quintiles so that the stocks with the smallest returns are classified at the bottom quintile (1st) and the ones with the highest returns at the top quintile (5th). To avoid the ask-bid short-term effects (Jegadeesh, 1990), we use a one-month gap between the formation period and the determination of the past stock returns. We go long (buy) the stocks in the upper quintile (winners) and short (sell) the stocks in the lowest quintile (losers). The portfolio is re-weighted at the end of the holding period. All returns are in percentage points. Statistically significant returns at the 5% level of significance based on Newey-West robust errors are reported with an asterisk. Annualized Sharpe ratios are reported in parenthesis.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Holding horizon | Bottom 20th percentile | Top 20th percentile | Winner minus loser | Number of stocks |
| *Panel A: All Stocks* | | | | |
| *1* | -8.71\* | -2.52 | 6.19 (0.16)\* | 3,780 |
| *6* | -4.56 | 0.73 | 5.29 (0.11) |
| *9* | 0.62 | -2.56 | -3.18 (-0.12) |
| *12* | -1.18 | 0.22 | 1.40 (0.04) |
| *Panel B: Portfolios based on the top 20% capitalized stocks* | | | | |
| *1* | 2.53 | 7.51 | 4.98 (0.08) | 728 |
| *6* | 7.27 | 4.77 | -2.50 (-0.04) |
| *9* | 10.13 | 5.67 | -4.46 (-0.07) |
| *12* | 8.54 | 7.08 | -1.46 (-0.03) |
| *Panel C: Portfolios based on the bottom 20% capitalized stocks* | | | | |
| *1* | -25.45\* | 3.11\* | 28.56 (0.49)\* | 636 |
| *6* | -18.35\* | 2.89\* | 21.24 (0.31)\* |
| *9* | -16.00\* | 4.60\* | 20.60 (0.23)\* |
| *12* | -17.14\* | 2.72\* | 19.86 (0.26)\* |
| *Panel D: Chiang Mai Initiative* *countries portfolios* | | | | | |
| *1* | -6.62 | -2.44 | 4.18 (0.07) | 2.914 |
| *6* | -1.58 | -4.16 | -2.58 (-0.04) |
| *9* | 1.69 | -5.12 | -6.81 (-0.12) |
| *12* | -0.95 | -3.91 | -2.96 (-0.06) |
| *Panel E: Non-Chiang Mai Initiative* *countries portfolios* | | | | | |
| *1* | -11.14 | 3.12 | 14.26 (0.45) | 655 |
| *6* | -10.10 | 2.56 | 12.66 (0.42) |
| *9* | -9.23 | -1.48 | 7.75 (0.37) |
| *12* | -3.74 | -3.15 | 0.59 (0.18) |
| *Panel F: ASEAN countries portfolios* | | | | | |
| *1* | -6.99 | 0.40 | 7.39 (0.14) | 593 |
| *6* | -7.28 | 0.48 | 7.76 (0.18) |
| *9* | -4.23 | 2.12 | 6.35 (0.24) |
| *12* | -8.46 | 0.56 | 9.02 (0.20) |

**Table 6c: Annualized momentum strategy returns for the U.S. stock markets**

This table reports the mean excess cumulative returns and the descriptive statistics of a momentum strategy, spanning the period March, 2010 to June, 2017. We sort the stocks of each panel according to their cumulative returns over the period t-12 to t-2 months prior the formation period of the portfolio and separate them into 5 quintiles so that the stocks with the smallest returns are classified at the bottom quintile (1st) and the ones with the highest returns at the top quintile (5th). To avoid the ask-bid short-term effects (Jegadeesh, 1990), we use a one-month gap between the formation period and the determination of the past stock returns. We go long (buy) the stocks in the upper quintile (winners) and short (sell) the stocks in the lowest quintile (losers). The portfolio is re-weighted at the end of the holding period. All returns are in percentage points. Statistically significant returns at the 5% level of significance based on Newey-West robust errors are reported with an asterisk. Annualized Sharpe ratios are reported in parenthesis.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Holding horizon | Bottom 20th percentile | Top 20th percentile | Winner minus loser | Number of stocks |
| *Panel A: All Stocks* | | | | |
| *1* | -3.23 | 7.85 | 11.08 (0.15)\* | 1,569 |
| *6* | 4.30 | 11.08\* | 6.78 (0.10) |
| *9* | 6.54 | 6.73 | 0.19 (-0.01) |
| *12* | 2.07 | 5.55 | 3.48 (0.05) |
| *Panel B: Portfolios based on the top 20% capitalized stocks* | | | | |
| *1* | -0.61 | 8.78 | 9.39 (0.12)\* | 251 |
| *6* | 7.88 | 7.14 | -0.74 (-0.02) |
| *9* | 7.75 | 4.01 | -3.74 (-0.07) |
| *12* | 4.37 | 6.38 | 2.01 (0.03) |
| *Panel C: Portfolios based on the bottom 20% capitalized stocks* | | | | |
| *1* | 0.41 | 2.99 | 2.58 (0.05) | 183 |
| *6* | 1.91 | 3.01 | 1.10 (0.01) |
| *9* | 2.26 | 3.83 | 1.57 (0.02) |
| *12* | -1.18 | 2.55 | 3.73 (0.07) |
| *Panel D: NYSE portfolios* | | | | | |
| *1* | -2.02 | 9.35 | 11.37 (0.16)\* | 773 |
| *6* | 5.70 | 6.01 | 0.31 (-0.01) |
| *9* | 4.23 | 6.73 | 2.50 (0.04) |
| *12* | 7.67 | 5.29 | -2.38 (-0.06) |
| *Panel E: NASDAQ portfolios* | | | | | |
| *1* | -6.83 | 8.05 | 14.88 (0.14)\* | 840 |
| *6* | 7.74 | 10.72 | 2.98 (0.09) |
| *9* | 5.00 | 7.24 | 2.24 (0.02) |
| *12* | -6.44 | 2.21 | 8.65 (0.09) |

**Table 7a: OLS regressions between industry portfolios returns and Eurostoxx 600 index**

This table presents regression results with the dependent variable defined as the Eurostoxx 600 index excess returns. Regressors include the lagged monthly market returns of portfolio industries as in Hong et al. (2007). The other regressors are: lagged RM (the market return), INF (the CPI inflation rate), IP (the European Union’s industrial production), MVOL (market volatility) and a dummy variable indicating the bear and bull state of the market (BB). We only report the coefficients in front of the lagged industry returns that are statistically significant. The sample period is January 2000-June 2017. In column (1) we report results based on all industry portfolios. In columns (2) and (3) we form industry portfolios based on their capitalization. In columns (4) and (5) we split industry portfolios between North and South EU stock markets. In column (6) we include industrial portfolios only from Eurozone countries. Statistically significant returns at the 5% level of significance based on Newey-West robust errors are reported with an asterisk.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | All industries portfolios | | | | Industry portfolios based on top 20% capitalized stocks | | | | Industry portfolios based on bottom 20% capitalized stocks | | | | North EU stock markets industry portfolios | | | | South EU stock markets industry portfolios | | | | Eurozone industry portfolios | | | |
|  | 1 | 6 | 9 | 12 | 1 | 6 | 9 | 12 | 1 | 6 | 9 | 12 | 1 | 6 | 9 | 12 | 1 | 6 | 9 | 12 | 1 | 6 | 9 | 12 |
| Aero | -0.08\* | 0.03 | 0.07 | -0.04 | -0.04 | 0.01 | 0.06 | -0.02 | -0.03 | 0.05 | -0.04 | 0.02 | -0.11\* | 0.01 | 0.06 | 0.05 | 0.00 | 0.05\* | -0.03 | 0.01 | -0.08\* | 0.03 | 0.07 | -0.04 |
| App | -0.04 | 0.03 | 0.01 | 0.07 | -0.03 | 0.01 | -0.03 | 0.04 | -0.04 | -0.02 | 0.06 | 0.02 | -0.04 | 0.00 | -0.07 | 0.06 | -0.05 | -0.01 | -0.04 | -0.08 | -0.03 | 0.04 | 0.00 | 0.06 |
| Auto | -0.08\* | 0.01 | 0.09\* | 0.03 | -0.07\* | 0.05 | 0.08\* | 0.01 | -0.05 | 0.06 | 0.08 | 0.07 | -0.05 | 0.05 | 0.06\* | 0.00 | 0.03 | -0.01 | -0.04 | -0.01 | -0.08\* | 0.01 | 0.09\* | 0.03 |
| Banks | -0.04 | 0.01 | -0.12\* | 0.02 | 0.01 | -0.03 | -0.10 | -0.10 | 0.01 | 0.00 | 0.00 | -0.03\* | 0.03 | -0.03 | -0.06 | -0.11 | 0.08 | 0.07 | 0.05 | 0.02 | -0.04 | 0.01 | -0.13\* | 0.01 |
| Bev | 0.02 | -0.16\* | 0.00 | 0.03 | 0.04 | -0.14 | -0.01 | -0.07 | 0.05 | -0.12\* | -0.13 | 0.02 | 0.03 | -0.16 | -0.01 | -0.09 | -0.01 | -0.11 | 0.03 | 0.02 | 0.03 | -0.16\* | 0.00 | 0.03 |
| Chem | 0.03 | -0.15 | -0.04 | 0.10 | -0.03 | -0.17 | 0.06 | 0.21 | 0.02 | -0.09 | 0.02 | -0.09 | 0.02 | -0.16 | 0.13 | 0.21 | -0.09 | 0.00 | 0.17 | 0.03 | 0.03 | -0.15 | -0.04 | 0.10 |
| Con | -0.07\* | -0.02 | -0.02 | 0.00 | -0.09\* | -0.03 | 0.00 | -0.01 | -0.17\* | -0.13\* | -0.09 | -0.09 | -0.12\* | -0.02 | 0.01 | 0.00 | 0.11\* | -0.02 | 0.02 | 0.05 | -0.07\* | -0.02 | -0.02 | 0.00 |
| Div | 0.16 | -0.05 | 0.06 | -0.11 | -0.02 | -0.18 | 0.14 | -0.08 | -0.09 | 0.02 | -0.07 | -0.02 | -0.01 | -0.13 | 0.09 | -0.04 | -0.07 | -0.05 | -0.11\* | -0.09 | 0.16 | -0.05 | 0.06 | -0.11 |
| Drug | 0.14 | -0.12 | -0.04 | 0.02 | 0.08 | -0.13 | 0.13 | -0.06 | 0.11\* | 0.02 | 0.04 | -0.04 | 0.07 | -0.14 | 0.19\* | -0.03 | -0.01 | -0.07 | 0.07 | 0.01 | 0.14 | -0.12 | -0.04 | 0.01 |
| Elec | 0.05 | -0.01 | -0.02 | 0.00 | 0.07 | 0.05 | 0.04 | 0.05 | -0.01 | 0.16\* | 0.06 | 0.01 | 0.08\* | 0.06 | 0.04 | 0.04 | -0.07 | 0.07 | 0.12 | 0.13 | 0.05 | -0.01 | -0.02 | 0.00 |
| Electr | -0.01 | 0.06 | -0.06 | 0.05 | -0.04 | 0.07 | -0.12 | 0.05 | 0.05 | 0.01 | -0.06 | 0.10 | 0.02 | 0.05 | -0.09 | 0.01 | -0.05\* | 0.02 | 0.00 | -0.02 | -0.01 | 0.06 | -0.06 | 0.04 |
| Fin | 0.05 | -0.10 | 0.05 | 0.03 | 0.11 | -0.08 | 0.07 | 0.02 | 0.12 | 0.09 | 0.12 | 0.07 | 0.10 | -0.13 | 0.01 | 0.07 | 0.01 | 0.14\* | -0.08 | 0.03 | 0.05 | -0.10 | 0.05 | 0.03 |
| Food | 0.08 | -0.02 | 0.15 | 0.05 | 0.07 | -0.02 | 0.07 | 0.07 | 0.01 | -0.04 | 0.10 | -0.08 | 0.12 | -0.06 | 0.13 | 0.03 | 0.08 | 0.07 | 0.05 | -0.09 | 0.08 | -0.03 | 0.15 | 0.06 |
| Mach | -0.05 | 0.22\* | 0.11 | 0.05 | -0.02 | 0.25\* | 0.07 | 0.10 | 0.00 | 0.07 | 0.16 | 0.06 | -0.05 | 0.24\* | 0.08 | 0.15 | -0.06 | 0.09 | -0.13 | -0.06 | -0.05 | 0.22\* | 0.11 | 0.05 |
| Med | 0.21 | -0.15 | 0.05 | -0.28\* | 0.12 | 0.06 | -0.03 | -0.13 | -0.06 | -0.04 | -0.12 | 0.09 | 0.11 | 0.12 | -0.08 | -0.15 | -0.03 | -0.03 | 0.00 | 0.04 | 0.20 | -0.16 | 0.04 | -0.28\* |
| Metal | 0.03 | 0.05 | -0.13\* | -0.16\* | 0.12 | 0.04 | -0.06 | 0.07 | -0.06 | 0.10 | -0.06 | -0.13\* | 0.10 | 0.06 | -0.05 | 0.09 | 0.00 | 0.01 | -0.01 | 0.03 | 0.03 | 0.06 | -0.13\* | -0.16\* |
| Metpr | 0.01 | -0.01 | 0.02 | 0.30\* | -0.13\* | 0.01 | -0.17 | 0.05 | 0.08 | -0.12\* | -0.05 | -0.02 | -0.14\* | 0.00 | -0.18 | 0.03 | 0.00 | -0.08 | 0.00 | -0.10 | 0.01 | -0.01 | 0.02 | 0.30\* |
| Misc | -0.19\* | -0.01 | -0.03 | -0.04 | -0.13 | 0.02 | -0.02 | -0.19\* | 0.06 | 0.03 | -0.01 | 0.06 | -0.04 | 0.00 | -0.05 | -0.17\* | 0.00 | -0.14\* | -0.03 | 0.07 | -0.19\* | -0.01 | -0.04 | -0.05 |
| Oil | -0.03 | 0.04 | -0.06 | 0.08 | -0.15 | -0.05 | -0.07 | 0.04 | -0.03 | -0.03 | -0.09 | 0.12 | -0.09 | -0.08 | -0.05 | 0.06 | -0.07 | 0.02 | -0.12 | -0.12 | -0.03 | 0.04 | -0.06 | 0.08 |
| Paper | 0.06 | 0.07 | 0.09 | -0.08 | 0.05 | 0.22\* | 0.07 | -0.19\* | -0.12\* | -0.07\* | -0.01 | 0.04 | 0.05 | 0.19 | 0.05 | -0.16 | 0.01 | 0.09\* | -0.01 | -0.06 | 0.05 | 0.07 | 0.09 | -0.08 |
| Print | 0.01 | -0.03 | 0.01 | 0.18\* | 0.18 | -0.16 | -0.11 | 0.24\* | 0.12\* | -0.06 | -0.06 | 0.02 | 0.17 | -0.25 | -0.09 | 0.24\* | -0.02 | -0.05 | 0.15\* | -0.03 | 0.01 | -0.03 | 0.01 | 0.17\* |
| Recr | 0.04 | 0.05 | -0.16 | -0.14 | -0.02 | 0.13 | -0.02 | -0.31\* | -0.07 | 0.01 | -0.05 | 0.00 | 0.03 | 0.19\* | 0.05 | -0.36\* | 0.07 | 0.02 | 0.04 | 0.14\* | 0.04 | 0.05 | -0.16 | -0.14 |
| Rest | 0.08 | 0.04 | 0.15 | -0.02 | 0.08 | 0.05 | 0.11 | -0.01 | -0.02 | 0.01 | 0.04 | -0.06\* | -0.04 | 0.14 | -0.08 | -0.07 | 0.07 | -0.10 | -0.04 | 0.02 | 0.08 | 0.04 | 0.15 | -0.02 |
| Ret | -0.14 | 0.03 | -0.05 | 0.09 | -0.13 | -0.18 | -0.03 | 0.10 | 0.11\* | -0.12\* | -0.03 | -0.01 | -0.16 | -0.25\* | -0.01 | 0.14\* | -0.04 | -0.02 | 0.04 | 0.02 | -0.14 | 0.03 | -0.05 | 0.09 |
| Serv | 0.05 | 0.03 | -0.02 | -0.15\* | -0.02 | -0.02 | -0.01 | -0.09 | -0.08 | 0.02 | 0.14\* | 0.10 | -0.07 | 0.03 | -0.02 | 0.05 | 0.03 | 0.03 | -0.07 | -0.08 | 0.05 | 0.03 | -0.02 | -0.15\* |
| Text | -0.28\* | -0.16 | -0.09 | 0.08 | -0.42\* | -0.03 | -0.11 | 0.03 | -0.04 | 0.04 | 0.03 | 0.10\* | -0.39\* | 0.20 | -0.22 | -0.01 | 0.03 | -0.10 | -0.12 | 0.12\* | -0.29\* | -0.14 | -0.06 | 0.11 |
| Trans | 0.00 | 0.07 | 0.02 | 0.04 | 0.09 | 0.01 | 0.06 | 0.00 | 0.07\* | 0.04\* | 0.04 | 0.02 | 0.09 | 0.02 | 0.06 | -0.04 | 0.05 | 0.01 | -0.05 | 0.03 | 0.00 | 0.07 | 0.01 | 0.03 |
| Util | 0.03 | 0.21\* | 0.08 | 0.03 | 0.11 | 0.01 | 0.11 | -0.14 | 0.10 | -0.13 | 0.07 | -0.15\* | 0.07 | -0.06 | 0.08 | -0.11 | 0.01 | 0.00 | -0.04 | 0.08 | 0.02 | 0.20\* | 0.07 | 0.02 |
| Whole | -0.11 | -0.15 | -0.02 | -0.20\* | 0.05 | -0.04 | 0.05 | -0.04 | -0.03 | -0.01 | -0.02 | 0.04 | 0.06 | -0.01 | 0.06 | -0.04 | 0.01 | 0.08 | 0.01 | -0.01 | -0.11 | -0.15 | -0.02 | -0.20\* |
| Constant | -0.04\* | 0.00 | 0.00 | 0.01 | -0.04\* | 0.01 | 0.00 | 0.01 | -0.04\* | 0.00 | 0.00 | -0.01 | -0.04\* | 0.00 | 0.00 | 0.01 | -0.04\* | -0.01 | 0.00 | 0.00 | -0.04\* | 0.00 | 0.00 | 0.01 |
| RM | 0.17 | 0.29\* | 0.05 | -0.07 | 0.23 | 0.30 | -0.06 | 0.31 | 0.16 | 0.15 | -0.04 | -0.01 | 0.23 | 0.23 | 0.06 | 0.07 | 0.11 | -0.01 | 0.02 | 0.05 | 0.18 | 0.29\* | 0.05 | -0.07 |
| INF | 0.00 | -0.01 | -0.01 | 0.00 | 0.00 | -0.02\* | -0.02 | 0.00 | 0.01 | -0.02\* | -0.02 | 0.00 | 0.00 | -0.02\* | -0.01 | 0.00 | 0.01 | -0.01 | -0.02 | -0.01 | 0.00 | -0.01 | -0.01 | 0.00 |
| MVOL | 1.34\* | -0.55 | 0.04 | -0.19 | 1.67\* | -0.51 | 0.28 | 0.10 | 1.58\* | -0.19 | -0.12 | 1.17 | 1.62\* | -0.13 | 0.23 | -0.23 | 1.27 | 0.45 | 0.20 | -0.01 | 1.33\* | -0.55 | 0.04 | -0.19 |
| IP | 0.39 | -0.68 | -0.22 | -0.21 | 0.35 | -0.79\* | -0.11 | -0.29 | 0.22 | -0.67\* | -0.29 | 0.25 | 0.39 | -0.79\* | -0.14 | -0.26 | 0.18 | -0.23 | -0.24 | -0.14 | 0.40 | -0.67 | -0.21 | -0.21 |
| BB | 0.04\* | 0.01 | 0.00 | -0.01 | 0.04\* | 0.01 | 0.00 | -0.01 | 0.04\* | 0.01 | 0.00 | -0.01 | 0.04\* | 0.01 | 0.00 | -0.01 | 0.04\* | 0.01 | 0.01 | -0.01 | 0.04\* | 0.01 | 0.00 | -0.01 |
| Adj-R2 (%) | 19.32 | 1.50 | -1.71 | 1.45 | 19.91 | 2.08 | -2.08 | -0.53 | 18.85 | 5.99 | 0.33 | -2.74 | 18.39 | 2.93 | -2.49 | -1.48 | 13.00 | 2.26 | -5.28 | -3.96 | 19.36 | 1.39 | -1.77 | 1.62 |
| Observations | 209 | 203 | 200 | 197 | 209 | 203 | 200 | 197 | 209 | 203 | 200 | 197 | 209 | 203 | 200 | 197 | 209 | 203 | 200 | 197 | 209 | 203 | 200 | 197 |

**Table 7b: OLS regressions between industry portfolios returns and STOXX Asia/Pacific 600.**

This table presents regression results with the dependent variable defined as the STOXX Asia/Pacific 600 index excess returns. Regressors include the lagged monthly market returns of portfolio industries as in Hong et al. (2007). The other regressors are: lagged RM (the market return), MVOL (market volatility) and a dummy variable indicating the bear and bull state of the market (BB). We only report the coefficients in front of the lagged industry returns that are statistically significant. The sample period is January 2000-June 2017. In column (1) we report results based on all industry portfolios. In columns (2) and (3) we form industry portfolios based on their capitalization. In columns (4) and (5) we split industry portfolios between Ching Mai and non- Ching Mai markets. In column (6) we include industrial portfolios only from ASEAN countries. Statistically significant returns at the 5% level of significance based on Newey-West robust errors are reported with an asterisk.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | All industries portfolios | | | | Industry portfolios based on top 20% capitalized stocks | | | | Industry portfolios based on bottom 20% capitalized stocks | | | | | | | | Ching Mai industry portfolios | | | | | | | | | | | Non Ching Mai industry portfolios | | | | | | | | | | ASEAN industry portfolios | | | | | | | | | | | |
|  | 1 | 6 | 9 | 12 | 1 | 6 | 9 | 12 | 1 | | 6 | | 9 | | 12 | | 1 | | | 6 | | | 9 | | | 12 | | 1 | | | 6 | | | 9 | | | 12 | 1 | | | 6 | | | 9 | | | 12 | | |
| Aero | -0.05 | -0.06 | 0.08 | 0.01 | -0.03 | -0.04 | 0.05 | 0.02 | -0.03 | -0.04 | | 0.05 | | 0.02 | | -0.05 | | | -0.05 | | | 0.06 | | | 0.00 | | 0.05\* | | | -0.02 | | | 0.00 | | | 0.00 | | 0.07 | | 0.03 | | | 0.01 | | | 0.16\* | | |
| Auto | 0.07 | 0.04 | 0.12 | -0.12 | 0.05 | 0.01 | 0.11 | -0.10 | 0.05 | 0.01 | | 0.11 | | -0.10 | | 0.08 | | | 0.03 | | | 0.15 | | | -0.11 | | 0.00 | | | -0.03 | | | -0.01 | | | 0.00 | | 0.05 | | 0.02 | | | 0.02 | | | -0.02 | | |
| Banks | 0.13 | -0.03 | 0.12 | -0.09 | 0.07 | -0.06 | 0.11 | -0.04 | 0.07 | -0.06 | | 0.11 | | -0.04 | | 0.21 | | | -0.02 | | | 0.06 | | | -0.18 | | -0.12 | | | 0.03 | | | 0.11 | | | 0.17 | | -0.27 | | -0.51\* | | | 0.04 | | | 0.16 | | |
| Bev | -0.15 | -0.15 | -0.01 | 0.01 | -0.16 | -0.12 | -0.03 | 0.00 | -0.16 | -0.12 | | -0.03\* | | 0.00 | | -0.14 | | | -0.15 | | | 0.01 | | | 0.00 | | -0.15\* | | | 0.04 | | | 0.01 | | | -0.03\* | | -0.03 | | 0.08 | | | -0.03 | | | 0.08 | | |
| Chem | -0.08 | 0.00 | -0.21 | -0.10 | -0.04 | -0.01 | -0.15 | -0.09 | -0.04 | -0.01 | | -0.15 | | -0.09 | | -0.07 | | | 0.01 | | | -0.22 | | | -0.19 | | 0.05 | | | 0.00 | | | -0.03 | | | 0.00 | | 0.10 | | -0.01 | | | 0.02 | | | -0.10 | | |
| Con | 0.07 | -0.06 | -0.18 | 0.19 | 0.06 | -0.07 | -0.17 | 0.18 | 0.06 | -0.07 | | -0.17 | | 0.18 | | 0.08 | | | -0.07 | | | -0.23 | | | 0.19 | | -0.09 | | | -0.19\* | | | 0.07 | | | 0.11 | | 0.17 | | 0.16 | | | -0.05 | | | 0.16 | | |
| Div | 0.07 | 0.18 | 0.14 | 0.12 | 0.01 | 0.16 | 0.12 | 0.10 | 0.01 | 0.16 | | 0.12 | | 0.10 | | -0.01 | | | 0.19 | | | 0.17 | | | 0.18 | | 0.12 | | | -0.05 | | | -0.03 | | | -0.08 | | -0.11 | | -0.09 | | | -0.05 | | | 0.00 | | |
| Drug | 0.07 | 0.01 | 0.27 | -0.10 | 0.10 | 0.01 | 0.18 | -0.08 | 0.10 | 0.01 | | 0.18 | | -0.08 | | 0.09 | | | 0.01 | | | 0.23\* | | | -0.06 | | -0.02 | | | 0.09 | | | 0.10 | | | 0.01 | | 0.00 | | -0.04 | | | 0.04 | | | 0.04 | | |
| Elec | -0.17 | 0.34\* | 0.05 | 0.10 | -0.12 | 0.29\* | 0.04 | 0.06 | -0.12 | 0.29 | | 0.04 | | 0.06 | | -0.16 | | | 0.29\* | | | 0.02 | | | 0.11 | | 0.01 | | | -0.01 | | | 0.08 | | | -0.07 | | 0.02 | | 0.03 | | | 0.17\* | | | 0.01 | | |
| Electr | 0.10 | -0.27\* | 0.10 | 0.10 | 0.10 | -0.21 | 0.08 | 0.07 | 0.10 | -0.21 | | 0.08 | | 0.07 | | 0.14 | | | -0.27\* | | | 0.09 | | | 0.11 | | 0.05 | | | 0.10 | | | -0.01 | | | -0.10 | | 0.15 | | -0.03 | | | -0.14\* | | | 0.01 | | |
| Fin | -0.24 | -0.13 | 0.03 | -0.01 | -0.19 | -0.12 | 0.06 | -0.01 | -0.19 | -0.12 | | 0.06 | | -0.01 | | -0.25\* | | | -0.13 | | | 0.06 | | | -0.05 | | 0.01 | | | 0.15 | | | 0.02 | | | 0.10 | | -0.13 | | 0.01 | | | 0.23\* | | | -0.09 | | |
| Food | 0.00 | -0.14 | -0.41 | -0.07 | 0.06 | -0.10 | -0.31 | -0.07 | 0.06 | -0.10 | | -0.31 | | -0.07 | | -0.02 | | | -0.07 | | | -0.39 | | | -0.14 | | 0.05 | | | 0.12 | | | -0.08 | | | 0.00 | | 0.17 | | 0.06 | | | -0.20 | | | 0.05 | | |
| Mach | 0.04 | 0.26 | -0.16 | -0.34 | 0.07 | 0.23 | -0.21 | -0.28 | 0.07 | 0.23\* | | -0.21 | | -0.28 | | -0.06 | | | 0.24 | | | -0.25 | | | -0.22 | | 0.06 | | | -0.04 | | | -0.03 | | | -0.01 | | -0.09 | | -0.07 | | | -0.16 | | | -0.15 | | |
| Med | 0.04 | -0.13 | -0.20\* | -0.16 | 0.03 | -0.14 | -0.15 | -0.18 | 0.03 | -0.14 | | -0.15 | | -0.18 | | 0.02 | | | -0.10 | | | -0.14 | | | -0.24\* | | -0.03 | | | -0.19 | | | -0.11 | | | -0.08 | | -0.09 | | -0.07 | | | -0.03 | | | 0.02 | | |
| Metal | -0.05 | 0.04 | -0.19\* | 0.12 | -0.05 | 0.02 | -0.17\* | 0.13 | -0.05 | 0.02 | | -0.17 | | 0.13 | | 0.07 | | | -0.05 | | | -0.10\* | | | 0.14\* | | -0.05 | | | 0.00 | | | -0.05 | | | -0.03 | | 0.04 | | -0.06 | | | -0.13 | | | -0.07 | | |
| Metpr | 0.19 | -0.05 | 0.06 | 0.13 | 0.18 | -0.01 | 0.02 | 0.12 | 0.18 | -0.01 | | 0.02 | | 0.12 | | 0.10 | | | -0.02 | | | 0.05 | | | 0.16 | | 0.00 | | | 0.04 | | | -0.06 | | | -0.01 | | -0.02 | | 0.19\* | | | -0.09 | | | -0.09 | | |
| Misc | -0.04 | -0.02 | 0.06 | 0.10\* | 0.01 | 0.00 | 0.02 | 0.10\* | 0.01 | 0.00 | | 0.02 | | 0.10 | | -0.03 | | | -0.04 | | | 0.06 | | | 0.12\* | | 0.00 | | | 0.06 | | | -0.16 | | | 0.02 | | -0.09\* | | -0.01 | | | 0.04\* | | | -0.01 | | |
| Oil | -0.13 | 0.07 | 0.05 | 0.00 | -0.12 | 0.05 | 0.07 | 0.01 | -0.12 | 0.05\* | | 0.07 | | 0.01 | | -0.15\* | | | 0.09 | | | 0.04 | | | 0.01 | | -0.07 | | | -0.11 | | | -0.01 | | | 0.09 | | -0.11\* | | 0.00 | | | 0.06 | | | 0.07 | | |
| Paper | -0.05 | -0.05 | 0.11 | 0.20 | -0.07 | -0.06 | 0.09 | 0.14 | -0.07 | -0.06 | | 0.09 | | 0.14 | | -0.04 | | | -0.08 | | | 0.11 | | | 0.17 | | 0.08 | | | -0.01 | | | 0.00 | | | 0.02 | | 0.00 | | -0.05 | | | 0.07 | | | 0.16 | | |
| Rest | 0.22 | -0.08 | 0.20 | -0.26\* | 0.17 | -0.09 | 0.18 | -0.27\* | 0.17 | -0.09 | | 0.18 | | -0.27 | | 0.17 | | | -0.05 | | | 0.19 | | | -0.28\* | | 0.22\* | | | -0.03 | | | 0.04 | | | -0.01 | | 0.23\* | | -0.01 | | | 0.00 | | | -0.08 | | |
| Recr | -0.02 | 0.55\* | 0.04 | 0.30 | -0.05 | 0.44\* | 0.06 | 0.31 | -0.05 | 0.44 | | 0.06 | | 0.31 | | 0.02 | | | 0.42\* | | | 0.05 | | | 0.34 | | -0.18 | | | 0.18 | | | 0.03 | | | 0.05 | | -0.09 | | -0.03 | | | -0.12 | | | -0.06 | | |
| Ret | 0.05 | 0.13 | -0.08 | 0.06 | 0.05 | 0.10 | -0.04 | 0.03 | 0.05 | 0.10 | | -0.04 | | 0.03 | | 0.03 | | | 0.09 | | | -0.11 | | | 0.10 | | -0.01 | | | -0.04 | | | -0.06 | | | -0.12 | | -0.03 | | 0.02 | | | -0.02 | | | -0.17 | | |
| Serv | -0.03 | -0.31\* | 0.21 | -0.38\* | -0.05 | -0.29\* | 0.19 | -0.34\* | -0.05 | -0.29 | | 0.19 | | -0.34 | | 0.03 | | | -0.26\* | | | 0.12 | | | -0.38\* | | -0.18 | | | -0.15 | | | 0.18 | | | 0.00 | | -0.16 | | 0.14 | | | 0.04 | | | -0.02 | | |
| Trans | 0.19 | 0.02 | -0.09 | -0.12 | 0.16 | 0.10 | -0.10 | -0.14 | 0.16 | 0.10 | | -0.10 | | -0.14 | | 0.19 | | | 0.09 | | | 0.07 | | | -0.17 | | 0.10 | | | 0.01 | | | -0.10 | | | -0.09 | | 0.19 | | -0.06 | | | 0.18 | | | 0.00 | | |
| Util | 0.25\* | 0.29\* | 0.18 | -0.29\* | 0.22\* | 0.23\* | 0.18\* | -0.26\* | 0.22 | 0.23 | | 0.18 | | -0.26 | | 0.23\* | | | 0.30\* | | | 0.20\* | | | -0.30\* | | 0.00 | | | 0.04 | | | -0.03 | | | 0.13 | | 0.00 | | 0.35\* | | | 0.24\* | | | -0.11 | | |
| Constant | -0.01 | 0.00 | 0.00 | 0.01 | -0.01 | 0.00 | 0.01 | 0.01 | -0.01 | 0.00 | | 0.01 | | 0.01 | | -0.01 | | | 0.00 | | | 0.00 | | | 0.01 | | -0.01 | | | 0.00 | | | 0.01 | | | 0.00 | | 0.00 | | 0.00 | | | 0.00 | | | 0.01 | | |
| RM | -0.30 | -0.19 | -0.24 | 0.56\* | -0.25 | -0.09 | -0.23 | 0.53\* | -0.25 | -0.09 | | -0.23 | | 0.53 | | -0.29 | | | -0.18 | | | -0.26 | | | 0.63\* | | 0.29 | | | 0.05 | | | 0.07 | | | -0.05 | | 0.10 | | -0.03 | | | 0.05 | | | 0.07 | | |
| MVOL | 0.32 | -0.12 | -0.21 | -0.28 | 0.25 | -0.07 | -0.37 | -0.15 | 0.25 | -0.07 | | -0.37 | | -0.15 | | 0.48 | | | -0.18 | | | -0.27 | | | -0.27 | | 0.87 | | | 0.30 | | | -0.96 | | | 0.02 | | 0.03 | | 0.15 | | | -0.32 | | | -0.25 | | |
| BB | 0.05\* | 0.01 | 0.02 | 0.03 | 0.04\* | 0.01 | 0.01 | 0.01 | 0.01\* | 0.01 | | 0.01 | | 0.01 | | 0.03\* | | | 0.04 | | | 0.02 | | | 0.03\* | | 0.05\* | | | 0.03 | | | 0.02 | | | 0.04 | | 0.09\* | | 0.05 | | | 0.02 | | | 0.04 | | |
| Adj-R2 (%) | 1.25 | -0.40 | 0.67 | -1.40 | 0.51 | 2.33 | 4.99 | 1.20 | 1.01 | -1.11 | | 2.23 | | -8.35 | | 2.52 | | 3.22 | | | 3.41 | | | 3.19 | | | | 17.71 | 10.00 | | | 11.53 | | | 9.84 | | | 2.06 | 1.41 | | | 4.97 | | | 1.06 | | |
| Observations | 209 | 204 | 201 | 198 | 209 | 204 | 201 | 198 | 209 | 204 | | 201 | | 198 | | 209 | | 204 | | | 201 | | | 198 | | | | 209 | 204 | | | 201 | | | 198 | | | 209 | 204 | | | 201 | | | 198 | | |

**Table 7c:US**

**OLS regressions between industry portfolios returns and the Dow Jones Industrial.**

This table presents regression results with the dependent variable defined as the Dow Jones Industrial index excess returns. Regressors include the lagged monthly market returns of portfolio industries as in Hong et al. (2007). The other regressors are: lagged RM (the market return), INF (the CPI inflation rate), IP (industrial production), MVOL (market volatility) and a dummy variable indicating the bear and bull state of the market (BB). We only report the coefficients in front of the lagged industry returns that are statistically significant. The sample period is January 2000-June 2017. In column (1) we report results based on all industry portfolios. In columns (2) and (3) we form industry portfolios based on their capitalization. In columns (4) and (5) we split industry portfolios between those traded in the NYSE and those traded in NASDAQ. Statistically significant returns at the 5% level of significance based on Newey-West robust errors are reported with an asterisk.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | All industries portfolios | | | | Industry portfolios based on top 20% capitalized stocks | | | | Industry portfolios based on bottom 20% capitalized stocks | | | | NYSE industry portfolios | | | | NASDAQ industry portfolios | | | |
|  | 1 | 6 | 9 | 12 | 1 | 6 | 9 | 12 | 1 | 6 | 9 | 12 | 1 | 6 | 9 | 12 | 1 | 6 | 9 | 12 |
| Basic | -0.22 | 0.13 | 0.12 | -0.22 | 0.05 | 0.11 | 0.21\* | -0.03 | 0.10\* | 0.02 | -0.05 | -0.05 | -0.19 | 0.26 | 0.05 | -0.19 | 0.04 | -0.04 | 0.04 | -0.02 |
| Cap | 0.06 | 0.01 | 0.25 | 0.06 | 0.27\* | -0.03 | 0.18 | 0.06 | 0.05\* | 0.04\* | -0.04 | -0.03 | 0.22\* | -0.16 | 0.21\* | 0.02 | 0.22\* | 0.05 | 0.01 | 0.09 |
| Consd | -0.05 | 0.02 | 0.06 | -0.05 | -0.04 | 0.06 | -0.01 | -0.02 | 0.06 | -0.11 | -0.06 | -0.08\* | 0.06 | -0.04 | 0.05 | 0.04 | 0.01 | 0.08 | 0.08 | -0.04 |
| Consnd | 0.01 | -0.19\* | -0.10 | 0.01 | -0.01 | -0.08\* | -0.04 | 0.00 | 0.04 | 0.02 | 0.01 | -0.01 | -0.03 | -0.03 | -0.10 | -0.14 | 0.06 | -0.18 | -0.03 | -0.12 |
| Cons | -0.01 | -0.10 | -0.51\* | -0.01 | -0.03 | 0.04 | -0.30\* | -0.02 | -0.24\* | 0.12 | -0.09 | 0.06 | 0.25 | -0.23 | -0.21 | 0.04 | 0.17 | -0.08 | -0.19 | -0.01 |
| Ene | 0.05 | 0.03 | 0.01 | 0.05 | 0.05 | 0.01 | 0.01 | 0.01 | -0.02 | 0.06\* | 0.01 | 0.02 | 0.03 | -0.08 | -0.03 | -0.03 | 0.04 | 0.04 | 0.08 | 0.09 |
| Fin | -0.19 | -0.08 | 0.06 | -0.19 | 0.10\* | -0.01 | 0.01 | -0.10 | 0.39\* | -0.04 | 0.17 | -0.19 | 0.23 | 0.21 | -0.08 | -0.24 | 0.35\* | 0.12 | 0.00 | -0.15 |
| Health | -0.10 | 0.06 | 0.01 | -0.10 | 0.00 | -0.14\* | 0.01 | -0.12 | -0.17 | -0.02 | -0.02 | 0.19 | 0.04 | 0.09 | -0.05 | -0.18 | -0.06 | -0.01 | 0.09 | -0.13 |
| Misc | 0.04 | -0.22\* | 0.17 | 0.04 | 0.04 | -0.25\* | 0.10 | 0.05 | 0.02 | -0.04 | 0.06\* | -0.01 | 0.08 | -0.19\* | 0.19 | 0.09 | -0.02 | -0.08 | -0.11 | -0.07 |
| Various | -0.10 | 0.23 | -0.05 | -0.10 | -0.01 | 0.10 | -0.04 | -0.03 | 0.14 | 0.06 | -0.04 | 0.19 | 0.06 | 0.14 | -0.10 | 0.14 | -0.03 | 0.06 | -0.06 | -0.02 |
| PU | 0.12 | 0.11 | -0.01 | 0.12 | -0.04 | 0.08 | 0.01 | 0.10 | 0.02 | -0.03 | 0.04 | 0.09 | -0.03 | 0.12 | 0.03 | 0.14 | 0.28 | -0.13 | -0.35\* | -0.05 |
| Tech | 0.38\* | -0.11 | 0.04 | 0.38\* | 0.16 | 0.05 | -0.10 | 0.22\* | 0.12 | -0.07 | -0.05 | -0.06 | 0.09 | -0.10 | 0.10 | 0.22\* | 0.15 | 0.21 | 0.14 | 0.29\* |
| Trans | -0.04 | -0.03 | 0.02 | -0.04 | 0.01 | -0.04 | -0.05 | -0.06 | 0.02 | 0.00 | -0.05\* | -0.01 | 0.00 | -0.02 | -0.14 | 0.05 | 0.01 | -0.07 | 0.13 | -0.03 |
| Constant | 0.00 | 0.00 | 0.01 | 0.00 | 0.02\* | 0.01 | 0.00 | 0.00 | 0.03\* | 0.00 | 0.01\* | 0.00 | 0.02\* | 0.01 | 0.01 | 0.01 | 0.03\* | 0.01 | 0.01 | 0.02 |
| RM | 0.09 | -0.03 | 0.04 | 0.09 | -0.37\* | -0.05 | 0.05 | 0.08 | -0.39\* | -0.06 | 0.10 | 0.05 | -0.35\* | -0.06 | 0.08 | 0.07 | -0.45\* | -0.05 | 0.20 | 0.19 |
| INF | 0.42 | 0.03 | -0.10 | 0.42 | -1.77\* | -0.07 | 0.01 | 0.53 | -2.19\* | 0.50 | -0.72 | 0.80 | -1.90\* | -0.02 | -0.18 | -0.02 | -2.77\* | -0.37 | -0.27 | -1.19 |
| MVOL | -1.70 | -1.53 | -2.33\* | -1.70 | -1.67\* | -1.03 | -2.08\* | -1.45 | -1.99\* | -1.24 | -2.31 | -1.63 | -2.14\* | -0.96 | -2.71 | -1.96 | -1.23 | -3.78 | -5.14\* | -2.25 |
| IP | -0.05 | 0.90 | -0.36 | -0.05 | -0.17 | 0.72 | -0.37 | -0.04 | -0.40 | 1.07 | -0.73 | -0.21 | -0.31 | 0.74 | -0.33 | -0.33 | -0.82 | 0.48 | 0.21 | -0.87 |
| BB | 0.01 | 0.01 | 0.01 | 0.01 | 0.02 | 0.01 | 0.01 | 0.02 | 0.01 | 0.02 | 0.01 | 0.01 | 0.03 | 0.03 | 0.02 | 0.01 | 0.03 | 0.01 | 0.05 | 0.01 |
| Adj-R2 (%) | 7.04 | 10.71 | 9.43 | 7.04 | 34.21 | 4.20 | 2.55 | -0.13 | 35.88 | 1.27 | -0.22 | -0.99 | 37.23 | 7.88 | 9.48 | 7.94 | 32.21 | -0.68 | 1.88 | -0.14 |
| Observations | 221 | 216 | 213 | 210 | 221 | 216 | 213 | 210 | 221 | 216 | 213 | 210 | 221 | 216 | 213 | 210 | 221 | 216 | 213 | 210 |

**Table 8**

**Annualized returns generated by an implementable trading strategy using lagged industry portfolios**

This table reports the annualized cumulative returns of different trading strategies based on the trading portfolios forecasts. Based on rolling windows of 120 months (10 years) to train our models and on a sliding window of one month, we take rolling forecasts for the market index returns and generate a trading strategy where the trader buys the market index if the model forecasts that it will yield a positive return or invests in the risk-free asset. The buy and hold strategy denotes that a trader each period buys the market index and sells it by the end of the holding period. Sharpe ratios are reported in parenthesis. The trading strategy spans the period March, 2010 to June, 2017. All returns are in percentage points. Statistically significant returns at the 5% level of significance based on Newey-West robust errors are noted with an asterisk.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Trading strategy | Holding Period | European markets returns | Asia / Pacific markets returns | U.S. markets return |
| Risk free |  | 0.23 | 0.31 | 0.43 |
| Buy and hold strategy | *1* | 5.90 (0.11) | 3.97 (0.06) | 10.17 (0.22)\* |
| *6* | 6.10 (0.12) | 4.68 (0.08) | 9.57 (0.25)\* |
| *9* | 5.21 (0.11) | 3.30 (0.06) | 9.94 (0.23)\* |
| *12* | 4.33 (0.09) | 2.10 (0.04) | 9.45 (0.22)\* |
| Random walk | *1* | 3.31 (0.11) | 0.17 (0.01) | 6.01 (0.17)\* |
| *6* | 2.38 (0.06) | 0.09 (0.01) | 6.45 (0.20)\* |
| *9* | 2.12 (0.07) | -1.05 (-0.04) | 6.90 (0.23)\* |
| *12* | 1.96 (0.04) | -1.06 (-0.05) | 6.44 (0.22)\* |
| Industry portfolios based on all stocks | *1* | 9.53 (0.36)\* | 2.49 (0.07) | 12.89 (0.42)\* |
| *6* | 6.44 (0.19) | 3.36 (0.01) | 5.39 (0.17) |
| *9* | 0.35 (0.01) | 3.44 (0.21) | 6.09 (0.18)\* |
| *12* | 3.54 (0.11) | 2.08 (0.06) | 3.82 (0.14) |
| Industry portfolios based on top 20% capitalized stocks | *1* | 9.17 (0.38)\* | 3.22 (0.07) | 14.30 (0.51)\* |
| *6* | 7.02 (0.24)\* | 5.54 (0.23) | 4.02 (0.13) |
| *9* | 4.36 (0.15) | 5.09 (0.16) | 1.87 (0.04) |
| *12* | 3.55 (0.12) | 1.09 (0.01) | 5.56 (0.18)\* |
| Industry portfolios based on bottom 20% capitalized stocks | *1* | 8.75 (0.10)\* | 3.74 (0.07) | 12.55 (0.38)\* |
| *6* | 2.72 (0.09) | 3.94 (0.08) | 4.52 (0.15) |
| *9* | 3.43 (0.15) | 3.07 (0.07) | 6.73 (0.21)\* |
| *12* | 4.05 (0.18) | 2.15 (0.05) | 6.65 (0.22)\* |
| North EU stock markets industry portfolios / Chiang Mai Initiative stock markets industry portfolios / NYSE | *1* | 6.23 (0.22)\* | 1.19 (0.05) | 13.70 (0.49)\* |
| *6* | 1.96 (0.07) | 1.22 (0.02) | 1.88 (0.06) |
| *9* | 2.94 (0.10) | 5.07 (0.15) | 4.92 (0.15)\* |
| *12* | 4.71 (0.17) | 0.65 (0.01) | 2.74 (0.08) |
| South EU stock markets industry portfolios / Non-Chiang Mai Initiative stock markets industry portfolios /NASDAQ | *1* | 7.67 (0.27)\* | 7.52 (0.23)\* | 13.43 (0.47)\* |
| *6* | 6.47 (0.23)\* | 2.52 (0.07) | 3.36 (0.10) |
| *9* | 3.04 (0.11) | 2.37 (0.06) | 7.07 (0.30)\* |
| *12* | 1.52 (0.05) | 1.22 (0.03) | 7.03 (0.22)\* |
| Eurozone’s industry portfolios /ASEAN industry portfolios | *1* | 9.53 (0.36)\* | 6.38 (0.03)\* |  |
| *6* | 5.90 (0.18) | 1.06 (0.03) |  |
| *9* | 0.35 (0.01) | 2.85 (0.08) |  |
| *12* | 3.54 (0.11) | 5.35 (0.17)\* |  |

**Appendix 1**

**Appendix Table 1a: Summary statistics for the EU stock markets**

This table presents summary statistics for the variables of interest. In Panel A, the variables are the returns of the 29 European industry portfolios in excess of the one-month Euribor rate. Returns are calculated as logarithmic differences, and monthly returns are calculated using end-of-month data. Panel B contains data about the European stock market and the state of the European economy. The sample period is January 2000–June 2017.

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| No | Abbreviation | Industry | | | | Mean | Std. dev | | Skewness | Kurtosis | Number of stocks |
| *Panel A: Industry portfolio returns* | | | | | | | |
| 1 | Aero | Aerospace | | | | 0.69 | 7.92 | | -0.69 | 5.5 | 41 |
| 2 | App | Apparel | | | | 0.89 | 6.41 | | -0.46 | 4.44 | 96 |
| 3 | Auto | Automotive | | | | 0.48 | 8.96 | | -1.15 | 7.94 | 173 |
| 4 | Banks | Banks | | | | 0.02 | 7.62 | | -0.31 | 5.92 | 384 |
| 5 | Bev | Beverages | | | | 0.71 | 5.86 | | -0.76 | 4.48 | 112 |
| 6 | Chem | Chemicals | | | | 0.59 | 6.04 | | -0.68 | 4.64 | 260 |
| 7 | Con | Construction | | | | 0.55 | 5.42 | | 2.74 | 3.02 | 507 |
| 8 | Div | Diversified | | | | 0.79 | 8.45 | | -0.34 | 3.23 | 134 |
| 9 | Drug | Drugs, Cosmetics & Health Care | | | | 0.68 | 3.89 | | -0.7 | 5.39 | 526 |
| 10 | Elec | Electrical | | | | 0.41 | 6.81 | | 0.09 | 5.49 | 188 |
| 11 | Electr | Electronics | | | | -0.25 | 9.82 | | -0.86 | 5.67 | 992 |
| 12 | Fin | Financial | | | | -0.01 | 7.45 | | -0.43 | 4.9 | 895 |
| 13 | Food | Food | | | | 0.52 | 4.16 | | -0.81 | 6.17 | 231 |
| 14 | Mach | Machinery & Equipment | | | | 0.83 | 6.69 | | -0.57 | 5.22 | 458 |
| 15 | Med | Medical Services | | | | 0.73 | 6.71 | | -0.44 | 5.82 | 159 |
| 16 | Metal | Metal Producers | | | | 0.63 | 8.42 | | 0.15 | 3.94 | 195 |
| 17 | Metpr | Metal Product Manufacturers | | | | 0.73 | 6.28 | | -0.39 | 3.53 | 117 |
| 18 | Misc | Miscellaneous | | | | 0.42 | 6.04 | | -0.22 | 3.91 | 617 |
| 19 | Oil | Oil, Gas & Coal | | | | 0.25 | 5.49 | | 0.22 | 4.62 | 350 |
| 20 | Paper | Paper | | | | 0.34 | 5.51 | | 0.35 | 5.64 | 136 |
| 21 | Print | Printing and Publishing | | | | 0.12 | 6.38 | | -0.43 | 6.06 | 123 |
| 22 | Recr | Recreation | | | | 0.2 | 6.27 | | -0.15 | 3.43 | 329 |
| 23 | Rest | Real Estate | | | | 0.67 | 4.85 | | -0.95 | 5.29 | 376 |
| 24 | Ret | Retailers | | | | 0.03 | 4.7 | | -0.22 | 4.96 | 241 |
| 25 | Serv | Service Organizations | | | | 0.31 | 5.9 | | -0.49 | 5.72 | 920 |
| 26 | Text | Textiles | | | | 0.82 | 6.59 | | -0.75 | 5.67 | 90 |
| 27 | Trans | Transportation | | | | 0.37 | 6.5 | | -0.3 | 3.39 | 220 |
| 28 | Util | Utilities | | | | -0.42 | 6.06 | | -0.63 | 5.91 | 498 |
| 29 | Whole | Wholesalers | | | | 0.47 | 5.33 | | -0.69 | 5.5 | 153 |
| *Panel B: Other variables* | | |  |  |
| 1 | MVOL | Market Volatility | | | | 1.11 | 0.61 | | 1.97 | 8.81 |  |
| 2 | MR | Market Returns | | | | -0.15 | 4.50 | | -0.70 | 4.07 |  |
| 3 | IP | Industrial production | | | | 0.06 | 0.94 | | -0.91 | 6.06 |  |
| 4 | INF | Inflation | | | | 0.15 | 0.36 | | -0.71 | 4.78 |  |
| 5 | Eurostoxx 600 | Market Index | | | | 0.02 | 0.04 | | -0.70 | 4.07 |  |

**Appendix Table 1b: Summary statistics for the Asia/Pacific stock markets**

This table presents summary statistics for the variables of interest. In Panel A, the variables are the returns of the 25 industry portfolios in excess of the one-month Libor rate. Returns are calculated as logarithmic differences, and monthly returns are calculated using end-of-month data. Panel B contains data about the stock market and the state of the economy used as control variables in our analysis. The sample period is January 2000–June 2017.

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| No | Abbreviation | Industry | | | | Mean | Std. dev | | Skewness | Kurtosis | Number of stocks |
| *Panel A: Industry portfolio returns* | | | | | | | |
| 1 | Aero | Aerospace | | | | 1.02 | 7.46 | | -0.09 | 4.71 | 29 |
| 2 | Auto | Automotive | | | | 0.62 | 5.23 | | -0.09 | 5.03 | 424 |
| 3 | Banks | Banks | | | | 0.38 | 5.03 | | -0.84 | 6.11 | 222 |
| 4 | Bev | Beverages | | | | 1.02 | 4.92 | | -0.35 | 4.29 | 106 |
| 5 | Chem | Chemicals | | | | 0.83 | 5.49 | | -0.53 | 3.92 | 700 |
| 6 | Con | Construction | | | | 1.02 | 5.74 | | -0.17 | 4.27 | 854 |
| 7 | Div | Diversified | | | | 1.01 | 4.85 | | -0.22 | 3.88 | 327 |
| 8 | Drug | Drugs, Cosmetics & Health Care | | | | 0.81 | 4.09 | | -0.53 | 3.42 | 122 |
| 9 | Elec | Electrical | | | | 0.54 | 4.03 | | -0.23 | 4.21 | 172 |
| 10 | Electr | Electronics | | | | 0.54 | 6.35 | | -0.50 | 3.57 | 2391 |
| 11 | Fin | Financial | | | | 0.58 | 7.00 | | -0.41 | 3.95 | 461 |
| 12 | Food | Food | | | | 0.99 | 4.31 | | -0.61 | 4.95 | 562 |
| 13 | Mach | Machinery & Equipment | | | | 0.78 | 6.18 | | -0.78 | 4.96 | 1092 |
| 14 | Med | Medical Services | | | | 0.96 | 4.29 | | -0.37 | 4.43 | 644 |
| 15 | Metal | Metal Producers | | | | 0.85 | 7.83 | | -0.76 | 5.84 | 165 |
| 16 | Metpr | Metal Product Manufacturers | | | | 0.86 | 7.65 | | -0.82 | 4.94 | 381 |
| 17 | Misc | Miscellaneous | | | | 0.86 | 6.17 | | -0.39 | 3.80 | 80 |
| 18 | Oil | Oil, Gas & Coal | | | | 0.66 | 6.82 | | -0.32 | 5.30 | 78 |
| 19 | Paper | Paper | | | | 0.74 | 7.06 | | -0.34 | 5.34 | 88 |
| 20 | Rest | Real Estate | | | | 0.90 | 5.88 | | -0.48 | 4.64 | 902 |
| 21 | Recr | Recreation | | | | 0.59 | 4.37 | | -0.48 | 3.76 | 1568 |
| 22 | Ret | Retailers | | | | 0.55 | 5.39 | | -0.32 | 3.88 | 483 |
| 23 | Serv | Service Organizations | | | | 0.67 | 5.72 | | -0.46 | 4.18 | 410 |
| 24 | Trans | Transportation | | | | 0.73 | 5.20 | | -0.83 | 6.52 | 324 |
| 25 | Util | Utilities | | | | 0.13 | 5.03 | | -0.58 | 3.85 | 163 |
| *Panel B: Other variables* | | |  |  |
| 1 | MVOL | Market Volatility | | | | 1.14 | 0.52 | | 2.84 | 18.42 |  |
| 2 | MR | Market Returns | | | | -0.17 | 3.64 | | -0.54 | 3.52 |  |
| 3 | STOXX Asia / Pacific 600 | Market Index | | | | -0.14 | 4.77 | | -0.60 | 3.89 |  |

**Appendix Table 1c: Summary statistics for the U.S. stock markets**

This table presents summary statistics for the variables of interest. In Panel A, the variables are the returns of the 13 industry portfolios in excess of the one-month Libor rate. Returns are calculated as logarithmic differences, and monthly returns are calculated using end-of-month data. Panel B contains data about the stock market and the state of the economy used as control variables in our analysis. The sample period is January 2000–June 2017.

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| No | Abbreviation | Industry | | | | Mean | Std. dev | | Skewness | Kurtosis | Number of stocks |
| *Panel A: Industry portfolio returns* | | | | | | | |
| 1 | Basic | Basic Industries | | | | 0.57 | 3.47 | | -2.37 | 20.35 | 126 |
| 2 | Cap | Capital Goods | | | | 0.73 | 3.65 | | -0.78 | 5.04 | 288 |
| 3 | Consd | Consumer Durables | | | | -0.02 | 3.99 | | 0.60 | 14.43 | 142 |
| 4 | Consnd | Consumer Non-Durables | | | | 0.27 | 4.82 | | 0.21 | 6.31 | 190 |
| 5 | Cons | Consumer Services | | | | 0.45 | 3.48 | | -1.59 | 11.53 | 552 |
| 6 | Ene | Energy | | | | 0.54 | 6.05 | | -2.09 | 24.27 | 101 |
| 7 | Fin | Finance | | | | 0.51 | 3.57 | | -0.36 | 8.74 | 1129 |
| 8 | Health | Health Care | | | | 0.38 | 2.84 | | -0.67 | 8.70 | 1142 |
| 9 | Misc | Miscellaneous | | | | 0.39 | 3.74 | | -2.46 | 16.88 | 147 |
| 10 | Various | Various | | | | 0.12 | 3.83 | | 0.12 | 5.81 | 757 |
| 11 | PU | Public Utilities | | | | 0.40 | 4.75 | | -2.44 | 19.09 | 101 |
| 12 | Tech | Technology | | | | 0.15 | 3.49 | | -0.15 | 11.65 | 723 |
| 13 | Trans | Transportation | | | | -0.09 | 3.33 | | -0.97 | 6.53 | 81 |
| *Panel B: Other variables* | | |  |  |
| 1 | MVOL | Market Volatility | | | | 0.98 | 0.61 | | 2.54 | 12.89 |  |
| 2 | MR | Market Returns | | | | 0.21 | 4.40 | | -0.96 | 4.67 |  |
| 3 | Inf | Inflation | | | | 0.18 | 0.30 | | -1.38 | 12.61 |  |
| 4 | IP | Industrial Production | | | | 0.06 | 0.68 | | -2.01 | 13.18 |  |
| 5 | Dow Jones Industrial | Market Index | | | | 0.01 | 0.04 | | -0.69 | 4.67 |  |
| 6 | Nasdaq Composite | Market Index | | | | 0.01 | 0.07 | | -0.77 | 4.92 |  |

**Appendix Table 2a: Annualized momentum strategy returns by industry for the EU stock markets**

The sample spans the period March, 2010 – June, 2017. The reported returns are the annualized contribution of each industry portfolio to the momentum returns of the WmL strategy. That is, we go long (short) on the industry portfolio according to its classification in the winner (loser) quintile. If the industry portfolio is not classified in either of the two quintiles its returns are dropped for that month. Statistically significant returns at the 5% level of significance based on Newey-West robust errors are reported with an aterisk.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | All industries portfolios | | | | Industry portfolios based on top 20% capitalized stocks | | | | Industry portfolios based on bottom 20% capitalized stocks | | | | North EU stock markets industry portfolios | | | | South EU stock markets industry portfolios | | | | Eurozone industry portfolios | | | |
|  | 1 | 6 | 9 | 12 | 1 | 6 | 9 | 12 | 1 | 6 | 9 | 12 | 1 | 6 | 9 | 12 | 1 | 6 | 9 | 12 | 1 | 6 | 9 | 12 |
| Aero | 1.14 | 0.72 | 0.64 | -0.48 | 0.52 | 0.28 | 0.72 | 0.62 | -2.05 | -0.58 | 0.36 | -0.72 | 0.86 | 0.44 | -0.40 | -1.01 | 1.76 | 1.69 | 1.50 | 2.09 | -3.18 | -2.60 | -3.13 | -2.50 |
| App | 1.47 | 2.75 | 2.59 | 2.52 | 0.88 | 1.27 | 1.37 | 1.32 | 6.23\* | 6.77\* | 6.84\* | 6.51\* | 5.07\* | 6.67\* | 6.82\* | 6.75\* | -5.10 | -4.71 | -4.27 | -4.24 | 4.06 | 5.17\* | 5.48\* | 5.53\* |
| Auto | -1.51 | -0.79 | -2.87 | -4.19 | 0.59 | 1.33 | -1.24 | -1.60 | 5.55\* | 4.41\* | 3.51 | 2.40 | 0.87 | 1.40 | -0.79 | -2.21 | -0.60 | -1.28 | -1.93 | -2.02 | -1.99 | -0.93 | -3.26 | -4.55 |
| Banks | 2.11 | 1.87 | 1.39 | 0.81 | 1.15 | 1.12 | 0.52 | -0.02 | -6.57 | -7.18 | -7.29 | -7.56 | 1.85 | 1.49 | 1.08 | -0.04 | 3.98\* | 3.67\* | 2.91\* | 3.27\* | 1.51 | 1.56 | 1.80 | 1.22 |
| Bev | 1.32 | 1.02 | 1.21 | 0.58 | -1.00 | -1.03 | -0.73 | -1.12 | 0.33 | -0.76 | -0.86 | -0.49 | 1.37 | 1.38 | 1.44 | 0.85 | 1.12 | -0.58 | -0.28 | -1.46 | 3.36 | 3.30 | 3.40\* | 2.63 |
| Chem | 1.71 | 1.87 | 1.38 | 1.12 | 0.74 | 1.00 | 0.86 | 0.63 | 1.68 | 1.88 | 1.36 | 0.59 | -0.69 | -0.60 | -1.07 | -1.47 | 3.55\* | 2.97\* | 2.47 | 2.88 | 1.64 | 1.53 | 1.02 | 0.87 |
| Con | 0.11 | 0.67 | 0.56 | 0.25 | -0.39 | 0.24 | 0.28 | 0.04 | 4.84\* | 5.13\* | 4.93\* | 5.27\* | -0.30 | -0.10 | -0.21 | -0.87 | 4.45 | 4.11 | 2.25 | 4.11 | 0.95 | 1.69 | 1.18 | 0.76 |
| Div | -0.11 | 0.21 | 0.43 | 0.05 | 1.94\* | 2.15\* | 1.96\* | 1.61\* | -5.47 | -4.17 | -4.45 | -5.28 | 0.20 | 0.16 | 0.30 | 0.17 | 1.50 | 1.43 | 1.15 | 0.49 | 1.37 | 2.13 | 2.49\* | 1.95 |
| Drug | 1.61 | 1.40 | 0.86 | 1.01 | 1.07 | 1.06 | 1.42\* | 1.56\* | 5.92 | 3.73 | 3.18 | 2.77 | 2.14\* | 2.15\* | 1.59\* | 1.47\* | 1.69 | 0.88 | 0.79 | 1.50 | 3.35\* | 3.50\* | 2.65 | 2.73 |
| Elec | 4.24\* | 4.71\* | 4.58\* | 3.29\* | 4.82\* | 5.36\* | 5.31\* | 4.65\* | -4.77 | -4.51 | -2.40 | -2.91 | 5.46\* | 6.19\* | 5.99\* | 4.76\* | 1.86 | 2.11 | 1.36 | 1.35 | 3.79\* | 4.32\* | 3.61\* | 2.76 |
| Electr | 0.20 | 0.24 | 0.17 | -0.13 | -0.15 | -0.23 | -0.09 | -0.48 | 6.53\* | 5.45\* | 4.24\* | 4.37\* | 0.50 | 0.29 | 0.17 | -0.18 | 2.74 | 2.70 | 3.21 | 2.71 | -0.13 | -0.31 | -0.24 | -0.81 |
| Fin | 0.98 | 1.28 | 1.10 | 0.62 | 1.00 | 0.75 | 0.38 | 0.22 | -0.32 | -0.01 | 0.06 | -0.05 | 0.50 | 1.08 | 0.63 | 0.63 | 8.69\* | 7.39\* | 7.18\* | 7.05\* | 1.37 | 1.73 | 1.64 | 0.96 |
| Food | 0.67 | 0.96 | 0.68 | 0.32 | -0.11 | -0.14 | -0.44 | -0.94 | -1.33 | -1.97 | -3.60 | -2.67 | 0.33 | 0.40 | -0.03 | -0.49 | 2.93 | 2.93 | 0.67 | 0.56 | 1.55\* | 2.30\* | 1.41 | 0.79 |
| Mach | 2.13\* | 3.84\* | 4.00\* | 3.43\* | -0.23 | 0.79 | 0.76 | 0.16 | 4.80 | 4.62 | 2.88 | 5.49 | 0.27 | 1.40 | 1.35 | 0.58 | 4.66\* | 6.68\* | 6.33\* | 5.84\* | 1.23 | 2.54 | 2.97\* | 2.79\* |
| Med | 4.81\* | 5.06\* | 5.37\* | 4.97\* | 3.63\* | 4.20\* | 4.67\* | 4.37\* | 4.86 | 3.43 | 3.17 | 2.24 | 4.43\* | 4.22\* | 4.39\* | 4.03\* | 2.30 | 2.02 | 1.29 | 1.39 | 4.06\* | 4.36\* | 4.17\* | 3.63\* |
| Metal | 2.37 | 2.54 | 3.00\* | 2.17 | 1.45 | 2.35\* | 2.64\* | 2.65\* | -2.78 | -1.94 | -1.81 | -1.43 | 0.52 | 0.60 | 0.95 | -0.15 | 4.78\* | 4.29\* | 3.75\* | 3.32 | 2.02 | 2.53 | 2.73 | 1.61 |
| Metpr | 5.74\* | 5.43\* | 5.12\* | 4.51\* | 2.56 | 2.19 | 1.77 | 2.05 | -2.72 | -2.14 | -2.31 | -2.37 | 3.80\* | 3.69\* | 3.52\* | 2.90 | -0.57 | -1.42 | -1.83 | -1.64 | 3.63 | 4.18\* | 4.44\* | 4.35\* |
| Misc | 3.95\* | 3.32\* | 3.37\* | 2.04 | 2.35\* | 2.15\* | 2.20\* | 1.65 | 9.32\* | 8.62 | 7.54 | 3.46 | 4.26\* | 4.00\* | 4.30\* | 3.14 | 2.11 | 2.22 | 1.65 | 1.66 | 1.27 | 0.05 | 0.94 | 0.26 |
| Oil | 0.64 | 0.53 | 0.63 | -0.56 | -0.64 | -0.66 | -0.82 | -1.21 | 2.72 | 2.10 | 3.77 | 4.02 | 0.44 | 0.33 | 0.10 | -0.98 | 2.46 | -0.04 | -1.25 | -0.98 | 2.56\* | 2.20 | 1.59 | 1.00 |
| Paper | 1.69 | 2.18 | 2.19 | 0.95 | -0.23 | 0.01 | -0.15 | -2.11 | -2.29 | -4.16 | -6.66 | -7.30 | 3.02 | 3.39 | 3.11 | 1.30 | -3.17 | -3.14 | -3.57 | -0.15 | 0.09 | 0.85 | 0.51 | 1.43 |
| Print | 2.14 | 3.21\* | 3.53\* | 2.44 | 2.71\* | 3.11\* | 2.99\* | 2.38\* | 2.20 | 3.55 | 3.18 | 1.60 | 3.24\* | 4.75\* | 4.85\* | 3.91\* | 0.54 | -2.57 | -2.91 | -3.16 | 2.73 | 3.44\* | 3.85\* | 2.73 |
| Recr | 1.76\* | 1.60\* | 1.12 | 0.82 | 2.73\* | 1.87\* | 1.62\* | 1.61 | 7.22\* | 5.97 | 3.47 | 3.07 | 1.36 | 0.78 | 0.10 | -0.17 | 2.47 | 1.87 | 1.67 | 2.40 | 1.31\* | 1.03 | 0.73 | 0.20 |
| Rest | 7.43\* | 7.29\* | 6.52\* | 4.90\* | 3.58\* | 4.10\* | 3.62\* | 3.46\* | -0.22 | -0.38 | -0.67 | -0.29 | 9.05\* | 9.37\* | 9.05\* | 7.36\* | 0.20 | 1.23 | 0.79 | 1.00 | 4.99\* | 5.13\* | 4.37\* | 2.15 |
| Ret | 3.38\* | 4.19\* | 4.54\* | 3.58\* | 1.99\* | 2.55\* | 2.84\* | 2.89\* | 4.53\* | 4.09 | 3.28 | 3.48 | 3.20\* | 3.89\* | 4.10\* | 3.09\* | 3.15\* | 2.41 | 1.52 | 1.03 | 0.40 | 1.12 | 0.76 | 0.14 |
| Serv | 0.61 | 0.38 | 0.48 | 0.01 | -0.17 | -0.05 | 0.00 | -0.33 | 3.54 | 3.85 | 4.31 | 3.78 | 2.52\* | 2.72\* | 2.37\* | 1.66 | -0.25 | 0.15 | -0.08 | -0.05 | 0.31 | 0.08 | 0.15 | -0.36 |
| Text | 1.83 | 1.92 | 1.73 | 0.81 | 1.70 | 1.92 | 1.83 | 0.96 | 5.12 | 4.99 | 5.11 | 5.70 | 1.53 | 1.45 | 1.37 | 0.35 | 2.00 | 1.42 | 0.75 | 1.15 | 2.46 | 2.62 | 2.68\* | 1.65 |
| Trans | 2.40 | 2.57 | 2.82 | 2.75 | 2.57 | 3.40 | 3.83 | 2.57 | -1.23 | 1.52 | 0.87 | 0.11 | 5.70 | 6.73 | 6.94 | 6.73 | 1.46 | 1.42 | 0.78 | 1.09 | -0.75 | -0.22 | -0.67 | -0.75 |
| Util | 1.77\* | 2.22\* | 1.78\* | 1.27 | 1.41\* | 1.72\* | 1.18 | 0.56 | 1.99 | 3.21 | 4.99 | 4.46 | 2.88\* | 2.94\* | 2.53\* | 2.00 | -0.80 | -0.77 | -1.44 | -0.38 | 3.16\* | 3.59\* | 3.09\* | 2.58 |
| Whole | 1.35 | 1.10 | 0.48 | -0.12 | 0.59 | 0.56 | -0.22 | -1.09 | 1.08 | 0.02 | -0.17 | -0.13 | 0.14 | 0.06 | -0.45 | -1.05 | 3.24\* | 3.57\* | 3.38\* | 3.09 | 2.47 | 2.24 | 1.89 | 1.55 |

**Appendix Table 2b: Annualized momentum strategy returns by industry for the Asia/Pacific stock markets**

The sample spans the period March, 2010 – June, 2017. The reported returns are the annualized contribution of each industry portfolio to the momentum returns of the WmL strategy. That is, we go long (short) on the industry portfolio according to its classification in the winner (loser) quintile. If the industry portfolio is not classified in either of the two quintiles its returns are dropped for that month. Statistically significant returns at the 5% level of significance based on Newey-West robust errors are reported with an asterisk.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | All industries portfolios | | | | Industry portfolios based on top 20% capitalized stocks | | | | Industry portfolios based on bottom 20% capitalized stocks | | | | Chiang Mai Initiative countries industry portfolios | | | | Non-Chiang Mai Initiative countries industry portfolios | | | | ASEAN countries industry portfolios | | | |
|  | 1 | 6 | 9 | 12 | 1 | 6 | 9 | 12 | 1 | 6 | 9 | 12 | 1 | 6 | 9 | 12 | 1 | 6 | 9 | 12 | 1 | 6 | 9 | 12 | |
| Aero | -0.37 | -3.29 | -1.66 | -1.64 | 0.30 | -2.02 | -1.04 | -2.47 | 0.52 | -3.27 | 1.43 | -0.90 | -0.39 | -2.88 | -0.32 | -0.47 | 0.57 | 2.48 | 1.15 | 4.11 | -1.75 | 2.22 | 2.45 | 0.08 | | |
| Auto | -0.44 | -1.35 | 0.32 | -2.07 | -0.52 | 0.50 | -0.14 | -0.88 | -2.65 | -1.62 | -1.76 | -3.35 | -0.41 | -0.05 | -0.33 | -1.09 | 5.85\* | 15.63\* | 14.22\* | 3.11 | 3.16 | -0.62 | -0.16 | -0.83 | | |
| Banks | -1.74 | -0.84 | -1.54 | -0.29 | -1.12 | -0.83 | -1.67 | 0.15 | 0.00 | -0.12 | 0.69 | -2.83 | -1.49 | -0.92 | -1.24 | -0.05 | -0.79 | -0.09 | -0.21 | -1.56 | -0.94 | -1.27 | -0.78 | 0.07 | | |
| Bev | 1.30 | -0.49 | 0.23 | -1.04 | 2.04 | -0.06 | -0.43 | -1.89 | -2.53 | 1.42 | 3.37 | -0.81 | 1.34 | 0.33 | -0.01 | 0.12 | 4.07 | 8.40\* | 14.40\* | 0.97 | -2.06 | -0.90 | -0.51 | 0.87 | | |
| Chem | -0.82 | 0.09 | -1.23 | -1.84 | -0.04 | -0.04 | -0.37 | -1.39 | -3.52 | -2.68 | -1.49 | -2.43 | -0.59 | -0.66 | -1.17 | -1.73 | 2.20 | -3.63 | 3.99 | 5.23 | 2.43 | 1.36 | 0.65 | -1.80 | | |
| Con | -0.27 | -2.31 | -1.15 | -0.80 | 0.22 | -2.22 | -2.14 | -0.21 | -3.66 | -1.69 | -2.30 | -1.44 | -0.65 | -2.73 | -1.81 | -0.92 | 5.30\* | 5.67\* | 7.40\* | 6.61\* | 0.35 | 0.90 | -0.67 | -0.26 | | |
| Div | 1.41\* | -0.15 | -0.24 | -0.74 | -0.05 | 0.33 | 0.32 | 0.05 | -0.90 | -1.27 | -1.13 | -1.78 | -0.50 | 0.26 | -0.26 | -1.11 | 6.29\* | 5.40\* | 4.84\* | 2.67\* | 0.70 | -0.07 | 0.47 | 1.77 | | |
| Drug | -0.93 | -0.78 | -2.36 | -0.66 | 0.56 | 0.55 | 0.37 | -0.17 | 0.53 | 1.86 | 3.68\* | 3.05 | -0.34 | 0.17 | 0.55 | -0.30 | 2.50 | 3.73 | 2.35 | 1.59 | 0.43 | 1.06 | 0.67 | -1.29 | | |
| Elec | -0.31 | -1.74 | -0.93 | 0.32 | -0.15 | -2.57 | -2.36 | -0.17 | -0.62 | -0.66 | 1.49 | 3.27 | -1.57 | -2.32 | -1.30 | 0.42 | 6.31\* | 2.85 | 4.91 | 7.86 | -1.24 | -3.46 | -2.67 | -1.14 | | |
| Electr | 0.15 | -0.85 | -0.48 | -0.12 | -0.03 | -0.29 | -1.00 | -0.08 | -4.49 | -3.73 | -4.49 | -4.56 | 0.23 | -0.72 | -0.90 | -0.22 | 6.40\* | 3.89\* | 4.53\* | 2.27\* | 1.45 | 0.14 | 0.48 | 0.67 | | |
| Fin | -1.38 | -0.79 | -2.01 | -0.27 | -1.66 | -0.93 | -1.90 | -2.13 | -1.87 | -0.83 | -1.73 | -2.31 | -1.65 | -1.67 | -3.26 | -3.22 | 3.06 | 1.44 | 1.95 | 3.42\* | -2.33 | -1.36 | 7.37 | -3.53 | | |
| Food | 1.47 | 0.33 | 0.43 | 1.30\* | 0.88 | 0.27 | 0.55 | 0.32 | -1.35 | -1.59 | -1.50 | -1.70 | 0.54 | 0.17 | 0.80 | 0.60 | 6.58\* | 8.19\* | 6.45\* | 9.13\* | 1.63 | -1.36 | 2.85 | 3.04\* | | |
| Mach | 0.65 | -0.65 | -0.47 | 0.09 | 0.00 | -1.08 | -0.91 | 0.64 | -2.04 | -3.20 | -1.55 | -1.61 | 0.41 | -0.86 | -1.08 | -0.48 | 3.42\* | 5.96\* | 1.35 | -3.62 | 3.95\* | 1.60 | 1.48 | 4.02\* | | |
| Med | -0.06 | -0.31 | -0.57 | 0.02 | -1.11 | -1.45 | -0.54 | 0.15 | -3.42 | -4.21 | -5.08 | -2.60 | -0.76 | -1.62 | -1.41 | -0.89 | 6.59\* | 4.87\* | 5.84\* | 6.77\* | -0.49 | -0.38 | 0.19 | -1.13 | | |
| Metal | 4.11\* | 2.59 | 3.76\* | 2.65\* | 1.34 | -1.76 | 0.43 | -0.56 | -10.40 | -5.42 | -6.94 | -5.27 | 0.99 | -1.41 | -0.71 | -0.13 | 7.21\* | 5.32\* | 4.86\* | 1.37 | 3.87\* | -1.14 | -0.73 | -1.07 | | |
| Metpr | 0.50 | -2.05 | -3.39 | -2.12 | -0.79 | -2.10 | -2.33 | -1.28 | -2.93 | -2.36 | -2.82 | -1.82 | -0.79 | -1.63 | -1.91 | -0.78 | 2.25 | 10.93\* | -0.59 | 0.11 | 0.86 | 0.58 | -2.18 | -0.68 | | |
| Misc | -0.91 | 1.01 | 0.38 | 1.03 | 0.35 | 1.34\* | 1.42\* | 0.52 | -0.50 | -2.05 | -1.11 | -0.56 | -1.56 | 0.15 | 0.76 | -2.19 | 0.93 | 1.17 | 0.94 | 0.82 | -1.07 | -0.59 | 2.18\* | 0.42 | | |
| Oil | 7.43\* | 6.08\* | 5.03\* | 3.92\* | -0.21 | 0.18 | -3.41 | -1.52 | -4.72 | -6.12 | -5.71 | -0.43 | -0.09 | -0.47 | -1.92 | -0.22 | 5.62 | 6.97\* | 4.60\* | 5.29\* | 1.11 | 0.14 | 1.55 | 2.77 | | |
| Paper | -0.23 | 0.48 | -0.18 | -0.75 | -0.76 | -3.00 | -4.21 | -3.77 | 1.73 | 9.33\* | 1.94 | -1.51 | -1.17 | -2.26 | -1.87 | -2.04 | 12.70\* | 4.40 | 5.93\* | 1.07 | -1.86 | 0.75 | -2.71 | -0.87 | | |
| Rest | -0.47 | -1.15 | -1.48 | -1.57 | 0.13 | -1.22 | -2.41 | -1.26 | -2.33 | -1.43 | -0.09 | -2.49 | -0.78 | -1.53 | -2.58 | -2.12 | 2.75\* | 2.10 | 0.43 | 0.48 | -0.20 | -0.47 | -0.32 | -0.26 | | |
| Recr | 0.72 | 0.73 | 0.22 | -0.58 | 1.21 | 0.75 | 0.16 | -0.16 | -2.02 | -2.88 | -2.39 | -3.64 | 0.61 | 0.62 | -0.56 | -1.32 | 5.63\* | 3.69\* | 2.47 | 3.03 | 0.80 | 0.88 | 2.47\* | 0.32 | | |
| Ret | -0.69 | -0.04 | -0.19 | -0.90 | 0.86 | -0.31 | 0.18 | -0.21 | -1.10 | -1.41 | -0.38 | -1.05 | 0.68 | -0.08 | -0.30 | -0.45 | 2.51\* | 0.12 | -0.80 | -2.01 | 2.01 | 2.77\* | 3.27\* | 2.97\* | | |
| Serv | 0.94 | 0.39 | -0.16 | -0.45 | 0.03 | -0.52 | -0.11 | -0.43 | -2.38 | -4.05 | -2.93 | -0.78 | -0.13 | -0.50 | -1.20 | -1.24 | 8.66\* | 7.38 | 8.58\* | -2.48 | 3.11\* | 0.17 | 2.17 | 1.91 | | |
| Trans | -0.19 | -0.87 | -1.17 | -0.79 | 0.35 | -0.50 | -0.64 | -0.34 | -1.99 | 0.49 | -1.72 | -0.12 | 0.57 | -0.06 | -0.99 | -0.39 | 5.92\* | 4.08\* | 2.89\* | 3.46\* | 2.94\* | 3.42\* | 2.75\* | 1.97\* | | |
| Util | -0.95 | -1.53 | 0.09 | -1.34 | 0.07 | -1.02 | -1.38 | -1.35 | -3.11 | -2.28 | -1.59 | -0.32 | 0.03 | -2.02 | -1.36 | -2.14 | 4.99\* | 0.99 | 0.12 | -2.68 | 0.92 | 0.28 | 1.56\* | 0.19 | | |

**Appendix Table 2c: Annualized momentum strategy returns by industry for the U.S. stock markets**

The sample spans the period March, 2010 – June, 2017. The reported returns are the annualized contribution of each industry portfolio to the momentum returns of the WmL strategy. That is, we go long (short) on the industry portfolio according to its classification in the winner (loser) quintile. If the industry portfolio is not classified in either of the two quintiles its returns are dropped for that month. Statistically significant returns at the 5% level of significance based on Newey-West robust errors are reported with an asterisk.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | All industries portfolios | | | | Industry portfolios based on top 20% capitalized stocks | | | | Industry portfolios based on bottom 20% capitalized stocks | | | | NYSE industry portfolios | | | | | | NASDAQ industry portfolios | | | | | | | |
|  | 1 | 6 | 9 | 12 | 1 | 6 | 9 | 12 | 1 | 6 | 9 | 12 | 1 | 6 | 9 | | 12 | | 1 | 6 | | 9 | | 12 | |
| Basic | 2.32\* | 0.61 | -0.50 | -0.32 | 1.58\* | 0.65 | -0.69 | 0.71 | -1.19 | -0.19 | -1.65 | 0.34 | 2.65\* | 1.42 | | 1.60 | | 0.39 | 0.81 | | -0.16 | | -4.39 | | -3.69 | |
| Cap | 1.25 | 2.50\* | 1.58\* | 1.53 | 1.00 | 0.19 | 1.26 | 0.78 | 0.02 | -1.21 | -2.50 | -1.52 | 0.42 | 1.34 | | -0.29 | | -0.13 | 2.98 | | 2.65 | | 6.15\* | | 3.95\* | |
| Consd | 1.63 | 2.08 | 1.92 | 0.47 | 3.53 | 3.42 | 2.22 | 0.86 | -1.73 | 0.52 | -0.87 | -0.58 | 1.57 | 1.45 | | 2.06 | | 0.28 | -2.16 | | -1.52 | | 1.37 | | -1.08 | |
| Consnd | 2.68 | 0.33 | 1.26 | 0.38 | 0.03 | -1.51 | -0.33 | -1.50 | -3.19 | -0.77 | 0.83 | 5.49\* | -0.19 | 0.10 | | 0.74 | | -0.15 | 5.02\* | | -0.03 | | -1.69 | | 0.31 | |
| Cons | 1.28 | -0.70 | -1.10 | -1.35 | 1.12 | -0.96 | -1.71 | -1.33 | -0.46 | -1.62 | -0.33 | 1.45 | 0.63 | 0.63 | | 0.51 | | -0.13 | 3.10\* | | 0.40 | | -4.10 | | -2.21 | |
| Ene | 1.83 | -0.62 | -0.02 | -1.18 | -0.03 | -1.48 | -1.18 | -0.68 | -2.53 | -1.61 | 0.10 | -1.84 | 0.30 | 0.03 | | -0.63 | | -0.80 | 2.88 | | 4.03 | | 1.25 | | -0.36 | |
| Fin | 0.77 | 1.05 | 0.62 | -0.21 | 0.77 | 1.01 | 0.86 | 0.11 | 0.55 | 0.87 | -1.54 | -0.16 | 0.88 | 0.30 | | 0.21 | | -0.43 | 1.41 | | 2.11\* | | 1.39 | | 0.50 | |
| Health | -0.66 | 0.48 | -1.43 | 1.03 | -0.55 | -0.08 | -1.71 | 0.72 | 0.20 | 1.13 | 1.54\* | 0.44 | 0.17 | -1.04 | | -1.15 | | -0.74 | -1.36 | | 2.08 | | -0.63 | | 3.11\* | |
| Misc | 1.07 | 1.91\* | 1.75 | 0.09 | 0.41 | 0.84 | -1.87 | 0.49 | 1.40 | -3.86 | -2.94 | -0.45 | 0.51 | 0.91 | | -0.07 | | -0.22 | 1.44 | | 2.81 | | 0.00 | | 1.45 | |
| Various | 0.62 | -0.22 | 0.63 | -0.88 | -1.26 | -0.25 | -0.85 | -1.67 | -0.25 | -1.74 | -2.75 | -1.97 | 0.15 | -1.47 | | 1.50 | | -2.13 | 2.71 | | 1.18 | | -1.07 | | -0.08 | |
| PU | -0.87 | -1.26 | -2.09 | -4.49 | -1.71 | -1.90 | -2.01 | -2.98 | -2.84 | 1.28 | -1.83 | 4.84 | -1.57 | -2.07 | | -1.97 | | -3.31 | 2.00 | | 1.37 | | 0.31 | | -3.43 | |
| Tech | 1.85\* | 0.37 | 0.72 | 0.18 | 2.39 | -0.60 | -0.22 | 0.09 | 0.40 | 0.64 | 1.42 | 1.03 | 1.71 | 0.28 | | 0.70 | | 0.49 | 2.80 | | 0.34 | | 0.23 | | 0.76 | |
| Trans | 7.23\* | 0.86 | 2.81 | 4.49 | 12.24\* | 2.07 | 4.42 | -3.35 | 5.88 | 5.70\* | 2.99 | 0.97 | 6.62 | 1.66 | | -1.14 | | -0.30 | 5.81 | | 8.25\* | | 6.23 | | 6.36 | |

**Appendix 2 (2000-2007 tables)**

**Appendix Table 3a: Contrarian strategy and its decomposition for the EU stock markets**

This table presents the annualized unconditional reversal strategy (π) cumulative returns and its decomposition into intra-industry () and inter-industry () reversal return components, as depicted in Equation (1), , where ,, and are the scaling factors for the unconditional, intra-industry, and inter-industry reversal strategies, so that the portfolio weights add to $1 long and $1 short in the respective strategies. All returns are percentages. Statistically significant returns at the 5% level of significance based on Newey-West robust errors are reported with an asterisk.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Holding horizon | All industry portfolios    (1) | Industry portfolios based on top 20% capitalized stocks    (2) | | Industry portfolios based on bottom 20% capitalized stocks    (3) | North countries industry portfolios    (4) | South countries industry portfolios    (5) | Eurozone industry portfolios  (6) |
| *Panel A: Unconditional reversal* | | | |  | | | | |
|  | *1* | 0.21 | 0.09 | | 0.59\* | 0.25 | 0.33\* | 0.28\* |
| *6* | -0.29\* | -0.17\* | | -0.35\* | -0.29\* | -0.33\* | -0.31\* |
| *9* | -0.25\* | -0.11\* | | -0.32 | -0.24 | -0.21 | -0.21 |
| *12* | -0.27\* | -0.20\* | | -0.27 | -0.26 | -0.11 | -0.19 |
| *Panel B: Intra-industry reversal* | | | |  | | | | |
|  | *1* | 0.23\* | 0.13\* | | 0.84\* | 0.28\* | 0.13\* | 0.30\* |
| *6* | -0.26\* | -0.09\* | | -0.24\* | -0.27\* | -0.20\* | -0.28\* |
| *9* | -0.26 | -0.02 | | -0.11 | -0.25 | -0.20\* | -0.32\* |
| *12* | -0.24 | -0.11 | | -0.11 | -0.25 | -0.11 | -0.20 |
|  | *1* | 0.25\* | 0.12\* | | 0.82\* | 0.29\* | 0.11\* | 0.32\* |
| *6* | -0.25\* | -0.09\* | | -0.24\* | -0.26\* | -0.18\* | -0.28\* |
| *9* | -0.26 | -0.02 | | -0.11 | -0.24 | -0.16\* | -0.32\* |
| *12* | -0.25 | -0.11 | | -0.11 | -0.25 | -0.09 | -0.20 |
| *Panel C: Inter-industry reversal* | | | |  | | | | |
|  | *1* | -0.06 | -0.05 | | -0.48\* | -0.07 | -0.50\* | -0.07 |
| *6* | -0.09 | -0.09 | | -0.33 | -0.08 | -0.26\* | -0.01 |
| *9* | -0.09 | -0.09\* | | -0.60\* | -0.09 | -0.17 | 0.11 |
| *12* | -0.09 | -0.10 | | -0.54\* | -0.08 | -0.01 | 0.06 |
|  | *1* | -0.04 | -0.03 | | -0.24\* | -0.04 | -0.23\* | -0.03 |
| *6* | -0.06 | -0.10 | | -0.19 | -0.06 | -0.18\* | -0.08 |
| *9* | -0.06 | -0.09\* | | -0.31\* | -0.05 | -0.08 | 0.04 |
| *12* | -0.08 | -0.10 | | -0.26\* | -0.06 | -0.03 | -0.04 |
| *Panel D: Scaling factors* | | | |  | | | | |
|  | *1* | 1.00 | 0.95 | | 0.99 | 1.00 | 0.91 | 1.00 |
| *6* | 1.00 | 0.95 | | 0.98 | 1.00 | 0.91 | 1.00 |
| *9* | 1.00 | 0.95 | | 0.98 | 1.00 | 0.91 | 1.00 |
| *12* | 1.00 | 0.94 | | 0.98 | 1.00 | 0.90 | 1.00 |
|  | *1* | 0.67 | 0.98 | | 0.45 | 0.65 | 0.78 | 0.64 |
| *6* | 0.67 | 0.99 | | 0.45 | 0.65 | 0.78 | 0.64 |
| *9* | 0.67 | 0.99 | | 0.46 | 0.65 | 0.77 | 0.64 |
| *12* | 0.66 | 0.97 | | 0.46 | 0.64 | 0.77 | 0.63 |

**Appendix Table 3b: Contrarian strategy and its decomposition for the Asia/Pacific stock markets**

This table presents the annualized unconditional reversal strategy (π) cumulative returns and their decomposition into intra-industry () and inter-industry () reversal return components, as depicted in Equation (1), , where ,, and are the scaling factors for the unconditional, intra-industry, and inter-industry reversal strategies, so that the portfolio weights add to $1 long and $1 short in the respective strategies. All returns are in percentages. Statistically significant returns at the 5% level of significance based on Newey-West robust errors are reported with an asterisk.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Holding horizon | All industry portfolios    (1) | Industry portfolios based on top 20% capitalized stocks    (2) | | Industry portfolios based on bottom 20% capitalized stocks    (3) | Chiang Mai Initiative countries industry portfolios  (4) | Non-Chiang Mai Initiative countries industry portfolios  (5) | ASEAN industry portfolios  (6) |
| *Panel A: Unconditional reversal* | | | |  | | | | |
|  | *1* | 0.12 | -0.05 | | 0.57\* | 0.08\* | 0.44\* | 0.39\* |
| *6* | -0.14\* | -0.12 | | -0.17 | -0.14 | -0.20 | -0.19\* |
| *9* | -0.22\* | -0.16 | | -0.07 | -0.23\* | -0.12 | -0.14\* |
| *12* | -0.24\* | -0.16 | | -0.18 | -0.22\* | -0.37\* | -0.24\* |
| *Panel B: Intra-industry reversal* | | | |  | | | | |
|  | *1* | 0.17\* | -0.01 | | 0.63\* | 0.14\* | 0.51\* | 0.50\* |
| *6* | -0.12\* | -0.06 | | -0.11 | -0.12\* | -0.13 | -0.09 |
| *9* | -0.18\* | -0.05 | | -0.09 | -0.19\* | -0.11 | -0.08 |
| *12* | -0.19\* | -0.01 | | -0.20\* | 0.16\* | -0.30\* | -0.11 |
|  | *1* | 0.17\* | 0.01 | | 0.64\* | 0.13\* | 0.50\* | 0.48\* |
| *6* | -0.12\* | -0.07 | | -0.11 | -0.12\* | -0.11 | -0.08 |
| *9* | -0.17\* | -0.04 | | -0.08 | -0.19\* | -0.10 | -0.07 |
| *12* | -0.19\* | -0.01 | | -0.19\* | -0.16\* | -0.30\* | -0.10 |
| *Panel C: Inter-industry reversal* | | | |  | | | | |
|  | *1* | -0.08\* | -0.08\* | | -0.16 | -0.08\* | -0.11 | -0.10 |
| *6* | 0.06 | 0.05 | | -0.20\* | -0.08\* | -0.15 | -0.20 |
| *9* | 0.03 | 0.03 | | -0.13 | 0.04 | -0.04 | -0.11 |
| *12* | -0.05 | -0.05 | | -0.21\* | -0.03 | -0.20\* | -0.22\* |
|  | *1* | -0.06\* | -0.05 | | -0.08 | -0.06\* | -0.06 | -0.10 |
| *6* | 0.04 | 0.04 | | -0.13\* | -0.05\* | -0.10 | -0.13 |
| *9* | 0.01 | 0.01 | | -0.06 | 0.02 | -0.04 | -0.08 |
| *12* | -0.02 | -0.02 | | -0.12\* | -0.01 | -0.16\* | -0.15\* |
| *Panel D: Scaling factors* | | | |  | | | | |
|  | *1* | 0.99 | 1.00 | | 1.00 | 0.99 | 0.99 | 0.96 |
| *6* | 0.99 | 1.00 | | 1.00 | 0.99 | 0.99 | 0.96 |
| *9* | 0.99 | 1.00 | | 1.00 | 0.99 | 0.98 | 0.96 |
| *12* | 0.99 | 1.00 | | 1.00 | 0.99 | 0.98 | 0.95 |
|  | *1* | 0.71 | 0.87 | | 0.53 | 0.73 | 0.66 | 0.73 |
| *6* | 0.71 | 0.87 | | 0.52 | 0.73 | 0.66 | 0.73 |
| *9* | 0.71 | 0.87 | | 0.51 | 0.73 | 0.66 | 0.72 |
| *12* | 0.70 | 0.87 | | 0.51 | 0.72 | 0.65 | 0.71 |

**Appendix Table 3c: Contrarian strategy and its decomposition for the U.S. stock markets**

This table presents the annualized unconditional reversal strategy (π) cumulative returns and their decomposition into intra-industry () and inter-industry () reversal return components, as depicted in Equation (1), , where ,, and are the scaling factors for the unconditional, intra-industry, and inter-industry reversal strategies, so that the portfolio weights add to $1 long and $1 short in the respective strategies. All returns are in percentages. Statistically significant returns at the 5% level of significance based on Newey-West robust errors are noted with an asterisk.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Holding horizon | All industry portfolios    (1) | Industry portfolios based on top 20% capitalized stocks    (2) | | Industry portfolios based on bottom 20% capitalized stocks    (3) | NYSE industry portfolios  (4) | NASDAQ industry portfolios  (5) |  |
| *Panel A: Unconditional reversal* | | | |  | | | | |
|  | *1* | -0.83\* | -0.96\* | | -1.02\* | -0.74\* | -0.92\* |  |
| *6* | -0.18\* | -0.14 | | -0.21\* | -0.11\* | -0.21\* |  |
| *9* | -0.01 | -0.09 | | -0.03 | -0.06 | 0.01 |  |
| *12* | -0.06 | -0.11 | | -0.08 | -0.11\* | -0.04 |  |
| *Panel B: Intra-industry reversal* | | | |  | | | | |
|  | *1* | -0.80\* | -0.77\* | | -0.78\* | -0.73\* | -0.80\* |  |
| *6* | -0.12 | -0.03 | | -0.05 | -0.10 | -0.12 |  |
| *9* | 0.09 | 0.04 | | 0.03 | -0.01 | 0.14 |  |
| *12* | 0.04 | 0.02 | | -0.06 | -0.08 | 0.10 |  |
|  | *1* | -0.78\* | -0.76\* | | -0.77\* | -0.69\* | -0.81\* |  |
| *6* | -0.11 | -0.04 | | -0.05 | -0.08 | -0.13 |  |
| *9* | 0.09 | 0.04 | | 0.03 | -0.01 | 0.15 |  |
| *12* | 0.03 | 0.02 | | -0.07 | -0.06 | 0.10 |  |
| *Panel C: Inter-industry reversal* | | | |  | | | | |
|  | *1* | -0.05\* | -0.30\* | | -0.32\* | -0.12\* | -0.24\* |  |
| *6* | -0.03 | -0.04 | | -0.19 | -0.02 | 0.01 |  |
| *9* | 0.01 | 0.02 | | 0.14 | -0.02 | 0.02 |  |
| *12* | -0.06 | -0.08 | | 0.17 | -0.04 | -0.02 |  |
|  | *1* | -0.05\* | -0.20\* | | -0.26\* | -0.06\* | -0.11\* |  |
| *6* | -0.02 | -0.03 | | -0.10 | -0.01 | -0.01 |  |
| *9* | -0.02 | -0.05 | | 0.02 | -0.03 | -0.03 |  |
| *12* | -0.02 | -0.04 | | 0.07 | -0.02 | 0.01 |  |
| *Panel D: Scaling factors* | | | |  | | | | |
|  | *1* | 0.97 | 0.97 | | 0.97 | 0.93 | 1.00 |  |
| *6* | 0.97 | 0.97 | | 0.98 | 0.94 | 1.00 |  |
| *9* | 0.97 | 0.97 | | 0.98 | 0.94 | 1.00 |  |
| *12* | 0.97 | 0.97 | | 0.98 | 0.93 | 1.00 |  |
|  | *1* | 0.59 | 0.80 | | 0.73 | 0.73 | 0.52 |  |
| *6* | 0.59 | 0.80 | | 0.73 | 0.73 | 0.52 |  |
| *9* | 0.56 | 0.79 | | 0.74 | 0.73 | 0.51 |  |
| *12* | 0.56 | 0.79 | | 0.73 | 0.71 | 0.51 |  |

**Appendix Table 4a: Inter–industry annualized momentum strategy returns for the EU stock markets**

This table presents the inter–industry annualized momentum strategy cumulative returns and their descriptive statistics. We sort all industrial value-weighted portfolios according to their cumulative returns over the period t-12 to t-2 months prior the formation period of our portfolio and separate them into 5 quintiles so that the industries with the smallest returns are classified at the bottom quintile and portfolios with the highest returns at the top quintile. In order to avoid ask-bid short term effects (Jegadeesh, 1990) we use a one-month gap between the formation period and the determination of the past stock returns. We go long (buy) the industries in the upper quintile (winners) and short (sell) the industries in the lowest quintile (losers). Our portfolio is re-weighted at each formation period. All returns are in percentage points. Statistically significant returns at the 5% level of significance based on Newey-West robust errors are reported with an asterisk.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Holding horizon | Bottom 20th percentile | Top 20th percentile | Winner minus loser | Number of stocks |
| *Panel A: Industry portfolios based on all stocks* | | | | |
| *1* | -2.04 | 12.05 | 14.09 (0.15) | 1,665 |
| *6* | 0.45 | 15.59 | 15.14 (0.18) |
| *9* | 8.44 | 21.74 | 13.30 (0.16) |
| *12* | 4.71 | 23.34\* | 18.63 (0.25) |
| *Panel B: Portfolios based on top 20% capitalized industries* | | | | |
| *1* | -6.76 | 12.07 | 18.83 (0.19) | 510 |
| *6* | -8.89 | 4.29 | 13.18 (0.13) |
| *9* | 0.57 | 10.10 | 9.53 (0.08) |
| *12* | -5.26 | 3.28 | 8.54 (0.07) |
| *Panel C: Portfolios based on bottom 20% capitalized industries* | | | | |
| *1* | -60.48\* | -9.74 | 50.74 (0.21)\* | 298 |
| *6* | -53.35\* | -11.61\* | 41.74 (0.09)\* |
| *9* | -50.81\* | -7.70 | 43.11 (0.12)\* |
| *12* | -50.92\* | -11.14\* | 39.78 (0.06)\* |
| *Panel D: North EU countries industry portfolios* | | | | |
| *1* | -0.89 | 12.70 | 13.59 (0.15) | 1,927 |
| *6* | 0.88 | 10.10 | 9.22 (0.09) |
| *9* | 6.54 | 6.86 | 0.32 (0.01) |
| *12* | -2.04 | 10.64 | 12.68 (0.15) |
| *Panel E: South EU countries industry portfolios* | | | | |
| *1* | 1.77 | 10.42 | 8.65 (0.09) | 348 |
| *6* | 5.06 | 9.40 | 4.34 (0.02) |
| *9* | 8.39 | 15.86\* | 7.47 (0.07) |
| *12* | 2.80 | 8.72 | 5.92 (0.05) |
| *Panel F: Eurozone industry portfolios* | | | | |
| *1* | -2.64 | 5.57 | 8.20 (0.07) | 1,387 |
| *6* | -3.03 | 6.70 | 9.73 (0.11) |
| *9* | -1.02 | 8.80 | 9.82 (0.12) |
| *12* | -2.78 | 7.81 | 10.60 (0.13) |

**Appendix Table 4b: Inter–industry annualized momentum strategy returns for the Asia/Pacific stock markets**

This table presents the inter–industry annualized momentum strategy cumulative returns and their descriptive statistics. We sort all industrial value-weighted portfolios according to their cumulative returns over the period t-12 to t-2 months prior the formation period of the portfolio and separate them into 5 quintiles, so that the industries with the smallest returns are classified at the bottom quintile and portfolios with the highest returns at the top quintile. In order to avoid ask-bid short term effects (Jegadeesh, 1990), we use a one-month gap between the formation period and the determination of the past stock returns. We go long (buy) the industries in the upper quintile (winners) and short (sell) the industries in the lowest quintile (losers). Our portfolio is re-weighted in each formation period. All returns are in percentages. Statistically significant returns at the 5% level of significance based on Newey-West robust errors are reported with an asterisk. Annualized Sharpe ratios are reported in parenthesis.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Holding horizon | Bottom 20th percentile | Top 20th percentile | Winner minus loser | Number of stocks |
| *Panel A: Industry portfolios based on all stocks* | | | | |
| *1* | 9.78 | 13.88 | 4.11 (0.02) | 3.780 |
| *6* | 12.46 | 12.35 | -0.10 (-0.08) |
| *9* | 12.38\* | 12.99\* | 0.61 (0.07) |
| *12* | 7.23 | 13.13\* | 5.90 (0.09) |
| *Panel B: Portfolios based on top 20% capitalized industries* | | | | |
| *1* | 11.18 | 13.77 | 2.59 (0.12) | 738 |
| *6* | 14.34\* | 16.76\* | 2.41 (0.14) |
| *9* | 12.91\* | 16.18\* | 3.27 (0.17) |
| *12* | 8.42 | 12.76\* | 4.34 (0.19) |
| *Panel C: Portfolios based on bottom 20% capitalized industries* | | | | |
| *1* | -18.36\* | -7.18 | 11.18 (0.30)\* | 636 |
| *6* | -14.71 | -3.93 | 10.78 (0.30)\* |
| *9* | -9.65 | -6.42 | 3.23 (0.15) |
| *12* | -13.13 | -6.33 | 6.81 (0.21) |
| *Panel D: Chiang Mai Initiative* *countries industry portfolios* | | | | |
| *1* | -0.51 | 3.95 | 4.45 (0.17) | 2,914 |
| *6* | 1.46 | 3.92 | 2.46 (0.13) |
| *9* | 3.87 | 6.51 | 2.65 (0.15) |
| *12* | -0.93 | 6.32 | 7.25 (0.27) |
| *Panel E:* *Non-Chiang Mai Initiative* *countries industry portfolios* | | | | |
| *1* | 14.55 | 20.53\* | 5.98 (0.13) | 655 |
| *6* | 12.49 | 20.94\* | 8.45 (0.14) |
| *9* | 10.41 | 19.75\* | 9.34 (0.18) |
| *12* | 9.35\* | 14.41\* | 5.06 (0.09) |
| *Panel F: ASEAN industry portfolios* | | | | |
| *1* | 0.25 | 9.24 | 8.99 (0.25) | 593 |
| *6* | -0.26 | 14.08\* | 14.34 (0.35)\* |
| *9* | 5.39 | 9.36 | 3.96 (0.05) |
| *12* | 8.50 | 6.71 | -1.80 (-0.02) |

**Appendix Table 4c: Inter–industry annualized momentum strategy returns for the U.S. stock markets**

This table presents the inter–industry annualized momentum strategy cumulative returns and their descriptive statistics. We sort all industrial value-weighted portfolios according to their cumulative returns over the period t-12 to t-2 months prior the formation period of the portfolio and separate them into 5 quintiles, so that the industries with the smallest returns are classified at the bottom quintile and portfolios with the highest returns at the top quintile. In order to avoid ask-bid short term effects (Jegadeesh, 1990), we use a one-month gap between the formation period and the determination of the past stock returns. We go long (buy) the industries in the upper quintile (winners) and short (sell) the industries in the lowest quintile (losers). Our portfolio is re-weighted in each formation period. All returns are in percentages. Statistically significant returns at the 5% level of significance based on Newey-West robust errors are reported with an asterisk. Annualized Sharpe ratios are reported in parenthesis.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Holding horizon | Bottom 20th percentile | Top 20th percentile | Winner minus loser | Number of stocks |
| *Panel A: Industry portfolios based on all stocks* | | | | |
| *1* | 0.06 | 9.11 | 9.05 (0.11) | 1,569 |
| *6* | 4.29 | 9.28 | 5.00 (0.04) |
| *9* | 12.99\* | 8.62 | -4.37 (-0.16) |
| *12* | 6.85 | 12.72\* | 5.88 (0.08) |
| *Panel B: Portfolios based on top 20% capitalized industries* | | | | |
| *1* | 0.24 | 10.20 | 9.96 (0.11) | 251 |
| *6* | 6.01 | 11.78\* | 5.76 (0.05) |
| *9* | 7.15 | 9.36\* | 2.21 (0.02) |
| *12* | 7.52 | 13.17\* | 5.66 (0.05) |
| *Panel C: Portfolios based on bottom 20% capitalized industries* | | | | |
| *1* | 0.58 | 4.92 | 4.34 (0.02) | 183 |
| *6* | 6.27 | 2.67 | -3.59 (-0.14) |
| *9* | 11.61 | 6.86 | -4.75 (-0.16) |
| *12* | 11.72 | 2.94 | -8.78 (-0.21) |
| *Panel D: NYSE industry portfolios* | | | | |
| *1* | 13.28\* | 14.08\* | 0.80 (0.05) | 773 |
| *6* | 14.55\* | 14.60\* | 0.05 (0.01) |
| *9* | 13.46\* | 20.13\* | 6.68 (0.11) |
| *12* | 11.57 | 14.07\* | 2.50 (0.02) |
| *Panel E: NASDAQ industry portfolios* | | | | |
| *1* | 3.08 | 7.52 | 4.45 (0.01) | 840 |
| *6* | 5.97 | -0.37 | -6.33 (-0.07) |
| *9* | 3.73 | -11.24 | -14.97 (-0.14) |
| *12* | 6.87 | -0.54 | -7.42 (-0.07) |

**Appendix Table 5a: Annualized momentum strategy returns for the EU stock markets**

This table reports the mean excess cumulative returns and the descriptive statistics of a momentum strategy. We sort the stocks of each panel according to their cumulative returns over the period t-12 to t-2 months prior the formation period of the portfolio and separate them into 5 quintiles so that the stocks with the smallest returns are classified at the bottom quintile (1st) and the ones with the highest returns at the top quintile (5th). To avoid the ask-bid short-term effects (Jegadeesh, 1990), we use a one-month gap between the formation period and the determination of the past stock returns. We go long (buy) the stocks in the upper quintile (winners) and short (sell) the stocks in the lowest quintile (losers). The portfolio is re-weighted at the end of the holding period. All returns are in percentage points. Statistically significant returns at the 5% level of significance based on Newey-West robust errors are reported with an asterisk. Annualized Sharpe ratios are reported in parenthesis.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Holding horizon | Bottom 20th percentile | Top 20th percentile | Winner minus loser | Number of stocks |
| *Panel A: All Stocks* | | | | |
| *1* | -15.03 | 9.95 | 24.98 (0.18) | 1,764 |
| *6* | -12.90 | 14.56 | 27.46 (0.24) |
| *9* | -12.79 | 17.75 | 30.54 (0.27) |
| *12* | -11.18 | 16.34 | 27.52 (0.23) |
| *Panel B: Portfolios based on the top 20% capitalized stocks* | | | | |
| *1* | -11.65 | 7.83 | 19.47 (0.16) | 1,310 |
| *6* | -9.82 | 8.69 | 18.51 (0.18) |
| *9* | 0.35 | 7.04 | 6.69 (0.05) |
| *12* | -9.26 | 1.90 | 11.17 (0.10) |
| *Panel C: Portfolios based on the bottom 20% capitalized stocks* | | | | |
| *1* | -31.33\* | 3.22 | 34.55 (0.33)\* | 832 |
| *6* | -11.17 | 2.87 | 14.03 (0.08)\* |
| *9* | -26.68\* | 2.30 | 28.98 (0.26)\* |
| *12* | -15.75 | 1.72 | 17.47 (0.14)\* |
| *Panel D: North EU stock markets portfolios* | | | | |
| *1* | -17.43 | 9.02 | 26.44 (0.19) | 4,730 |
| *6* | -13.36 | 10.28 | 23.64 (0.18) |
| *9* | -13.41 | 10.12 | 23.53 (0.20) |
| *12* | -18.52 | 3.62 | 22.14 (0.19) |
| *Panel E: South EU stock markets portfolios* | | | | |
| *1* | 2.81 | 15.38\* | 12.57 (0.11) | 1,003 |
| *6* | 7.44 | 8.91 | 1.47 (0.02) |
| *9* | 11.16 | 14.98\* | 3.82 (0.01) |
| *12* | 14.20 | 6.92 | -7.28 (-0.15) |
| *Panel F: Eurozone portfolios* | | | | |
| *1* | -18.00 | 8.13 | 26.13 (0.16) | 3,597 |
| *6* | -5.09 | 5.23 | 10.32 (0.07) |
| *9* | -14.29 | 5.00 | 19.29 (0.25)\* |
| *12* | -11.00 | 1.80 | 12.79 (0.14) |

**Appendix Table 5b: Annualized momentum strategy returns for the Asia/Pacific stock markets**

This table reports the mean excess cumulative returns and the descriptive statistics of a momentum strategy. We sort the stocks of each panel according to their cumulative returns over the period t-12 to t-2 months prior the formation period of the portfolio and separate them into 5 quintiles so that the stocks with the smallest returns are classified at the bottom quintile (1st) and the ones with the highest returns at the top quintile (5th). To avoid the ask-bid short-term effects (Jegadeesh, 1990), we use a one-month gap between the formation period and the determination of the past stock returns. We go long (buy) the stocks in the upper quintile (winners) and short (sell) the stocks in the lowest quintile (losers). The portfolio is re-weighted at the end of the holding period. All returns are in percentage points. Statistically significant returns at the 5% level of significance based on Newey-West robust errors are reported with an asterisk. Annualized Sharpe ratios are reported in parenthesis.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Holding horizon | Bottom 20th percentile | Top 20th percentile | Winner minus loser | Number of stocks |
| *Panel A: All Stocks* | | | | |
| *1* | -1.27 | 8.04 | 9.31 (0.12)\* | 3,780 |
| *6* | 10.32 | 5.59 | -4.73 (-0.06) |
| *9* | 14.86 | 15.27\* | 0.41 (0.27) |
| *12* | 16.00 | 14.12\* | -1.88 (-0.01) |
| *Panel B: Portfolios based on the top 20% capitalized stocks* | | | | |
| *1* | -6.47 | 8.50 | 14.96 (0.20)\* | 728 |
| *6* | 3.04 | 7.02 | 3.99 (0.03) |
| *9* | 1.64 | 9.66 | 8.02 (0.13) |
| *12* | 2.22 | 11.02\* | 8.80 (0.15) |
| *Panel C: Portfolios based on the bottom 20% capitalized stocks* | | | | |
| *1* | -18.18\* | -4.76 | 13.42 (0.20)\* | 636 |
| *6* | -19.26\* | -3.81 | 15.45 (0.23)\* |
| *9* | -19.84\* | -4.36 | 15.48 (0.20)\* |
| *12* | -15.72 | -0.47 | 15.25 (0.21)\* |
| *Panel D: Chiang Mai Initiative* *countries portfolios* | | | | | |
| *1* | -15.88 | 5.37 | 21.26 (0.24)\* | 2.914 |
| *6* | -6.43 | 1.68 | 8.10 (0.10) |
| *9* | -2.44 | 7.42 | 9.86 (0.12) |
| *12* | -1.31 | 6.55 | 7.86 (0.10) |
| *Panel E: Non-Chiang Mai Initiative* *countries portfolios* | | | | | |
| *1* | -25.33 | 20.19\* | 45.53 (0.36)\* | 655 |
| *6* | 3.95 | 20.49\* | 16.54 (0.16) |
| *9* | 17.32 | 22.54\* | 5.22 (0.03) |
| *12* | 8.63 | 18.21\* | 9.57 (0.09) |
| *Panel F: ASEAN portfolios* | | | | | |
| *1* | -6.57 | 6.66 | 13.23 (0.14)\* | 593 |
| *6* | -5.67 | 9.46\* | 15.13 (0.32) |
| *9* | 0.39 | 8.34\* | 7.95 (0.19) |
| *12* | 4.14 | 7.51 | 3.38 (0.01) |

**Appendix Table 5c: Annualized momentum strategy returns for the U.S. stock markets**

This table reports the mean excess cumulative returns and the descriptive statistics of a momentum strategy. We sort the stocks of each panel according to their cumulative returns over the period t-12 to t-2 months prior the formation period of the portfolio and separate them into 5 quintiles so that the stocks with the smallest returns are classified at the bottom quintile (1st) and the ones with the highest returns at the top quintile (5th). To avoid the ask-bid short-term effects (Jegadeesh, 1990), we use a one-month gap between the formation period and the determination of the past stock returns. We go long (buy) the stocks in the upper quintile (winners) and short (sell) the stocks in the lowest quintile (losers). The portfolio is re-weighted at the end of the holding period. All returns are in percentage points. Statistically significant returns at the 5% level of significance based on Newey-West robust errors are reported with an asterisk. Annualized Sharpe ratios are reported in parenthesis.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Holding horizon | Bottom 20th percentile | Top 20th percentile | Winner minus loser | Number of stocks |
| *Panel A: All Stocks* | | | | |
| *1* | 8.22 | 8.34 | 0.13 (0.01) | 1,569 |
| *6* | 7.83 | 5.88 | -1.95 (-0.07) |
| *9* | 12.65 | 10.94 | -1.72 (-0.08) |
| *12* | 10.42 | 10.54 | 0.12 (0.05) |
| *Panel B: Portfolios based on the top 20% capitalized stocks* | | | | |
| *1* | 8.09 | 8.03 | -0.06 (0.05) | 251 |
| *6* | 8.83 | 6.49 | -2.35 (-0.08) |
| *9* | 12.45 | 11.41 | -1.04 (-0.06) |
| *12* | 13.24 | 9.60 | -3.63 (-0.11) |
| *Panel C: Portfolios based on the bottom 20% capitalized stocks* | | | | |
| *1* | 0.19 | 10.00\* | 9.81 (0.20) | 183 |
| *6* | -12.96 | 7.53 | 20.48 (0.24) |
| *9* | -1.79 | 8.51 | 10.30 (0.08) |
| *12* | -13.92 | 9.28 | 23.20 (0.27) |
| *Panel D: NYSE portfolios* | | | | | |
| *1* | 8.41 | 10.86 | 2.46 (0.02) | 773 |
| *6* | 9.30 | 11.77\* | 2.47 (0.01) |
| *9* | 8.66 | 17.72\* | 9.07 (0.18) |
| *12* | 8.08 | 15.95\* | 7.87 (0.16)\* |
| *Panel E: NASDAQ portfolios* | | | | | |
| *1* | 8.06 | 3.16 | -4.90 (-0.05) | 840 |
| *6* | 6.08 | 8.85 | 2.77 (0.02) |
| *9* | 19.00\* | 5.61 | -13.39 (-0.12)\* |
| *12* | 25.04\* | 6.15 | -18.89 (-0.16)\* |

**Appendix Table 6a: Annualized momentum strategy returns by industry for the EU stock markets**

The reported returns are the annualized contribution of each industry portfolio to the momentum returns of the WmL strategy. That is, we go long (short) on the industry portfolio according to its classification in the winner (loser) quintile. If the industry portfolio is not classified in either of the two quintiles its returns are dropped for that month. Statistically significant returns at the 5% level of significance based on Newey-West robust errors are reported with an asterisk.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | All industries portfolios | | | | Industry portfolios based on top 20% capitalized stocks | | | | Industry portfolios based on bottom 20% capitalized stocks | | | | North EU stock markets industry portfolios | | | | South EU stock markets industry portfolios | | | | Eurozone industry portfolios | | | |
|  | 1 | 6 | 9 | 12 | 1 | 6 | 9 | 12 | 1 | 6 | 9 | 12 | 1 | 6 | 9 | 12 | 1 | 6 | 9 | 12 | 1 | 6 | 9 | 12 |
| Aero | -1.63 | -1.68 | -1.70 | -1.72 | -2.99\* | -2.73\* | -2.46\* | -2.82\* | -5.08 | -5.88 | -6.09 | -5.83 | -1.13 | -0.85 | -0.83 | -0.58 | -2.99\* | -3.01\* | -3.04\* | -3.08\* | -1.67 | -1.92 | -2.52 | -2.25 |
| App | 2.64 | 2.59 | 2.57 | 2.55 | 2.80 | 3.40 | 3.72 | 3.53 | -0.60 | -1.26 | -0.89 | -1.39 | 1.43 | 1.65 | 2.49 | 2.57 | 3.85 | 4.33 | 4.48 | 5.87 | 1.61 | 1.41 | 1.85 | 1.73 |
| Auto | -0.92 | -0.97 | -1.00 | -1.01 | -1.32\* | -1.58\* | -1.52\* | -1.60\* | 8.43 | 10.32\* | 11.18\* | 11.82\* | -2.50 | -3.33 | -3.61 | -4.22 | 0.70 | 1.07 | 1.20 | 0.98 | -1.31 | -1.48 | -1.61 | -1.84 |
| Banks | 0.06 | 0.02 | -0.01 | -0.02 | -2.69\* | -2.76\* | -2.83\* | -2.80\* | -0.92 | -1.57 | -1.87 | -2.03 | 1.20 | 1.09 | 1.44 | 1.43 | -1.39 | -1.64 | -1.39 | -1.04 | 0.18 | 0.02 | 0.11 | 0.49 |
| Bev | -0.81 | -0.86 | -0.88 | -0.90 | -4.39\* | -4.52\* | -4.55\* | -4.03 | -1.97 | -2.53 | -1.93 | -1.21 | -1.74 | -1.85 | -1.42 | -0.67 | 0.35 | 0.54 | -0.07 | 1.37 | -0.12 | -0.57 | -0.35 | -0.01 |
| Chem | -2.75 | -2.80 | -2.83 | -2.84 | -1.35\* | -1.24\* | -1.02\* | -0.87 | -0.75 | -1.06 | -1.08 | -0.96 | -1.92 | -2.24 | -2.20 | -2.34 | -2.69 | -2.73 | -2.25 | -1.61 | -5.34\* | -5.91\* | -6.09\* | -6.14\* |
| Con | -0.17 | -0.21 | -0.24 | -0.26 | -1.44 | -1.27 | -1.22 | -0.94 | 8.06 | 7.97 | 8.55 | 9.18 | -0.61 | -0.23 | -0.08 | -0.06 | -0.78 | 0.04 | 0.74 | 1.13 | -0.32 | -0.13 | -0.06 | -0.44 |
| Div | -3.68 | -3.73 | -3.76 | -3.77 | -3.35\* | -3.83\* | -3.93\* | -4.14\* | -7.98\* | -8.01\* | -7.37\* | -7.69 | -4.37\* | -5.14\* | -5.04 | -4.95 | 0.98 | 2.80 | 3.61 | 5.20 | -1.03 | -0.90 | -0.70 | -0.71 |
| Drug | 2.48 | 2.43 | 2.41 | 2.39 | 4.14 | 4.13 | 4.58 | 4.44 | -2.21 | -1.77 | -2.63 | -2.12 | 2.10 | 2.73 | 3.59 | 3.94 | 2.28 | 3.52 | 4.34 | 4.48 | 3.07 | 2.65 | 3.34 | 3.33 |
| Elec | -2.54 | -2.58 | -2.61 | -2.62 | 0.78 | 1.53 | 1.50 | 1.69 | -9.54 | -9.59 | -9.33 | -10.10 | -3.97\* | -4.33 | -4.86 | -5.31 | 1.03 | 2.12 | 2.72 | 2.92 | -1.38 | -0.92 | -1.02 | -0.72 |
| Electr | 1.39 | 1.34 | 1.31 | 1.30 | -0.84 | -0.50 | -0.48 | -0.26 | -2.70 | -2.74 | -2.85 | -3.26 | 0.69 | 1.73 | 2.24 | 2.85 | 4.36 | 6.46 | 7.79\* | 8.26 | 1.69 | 2.57 | 2.95 | 3.44 |
| Fin | -0.46 | -0.51 | -0.53 | -0.55 | -2.66\* | -2.48\* | -2.51\* | -2.27\* | -3.19\* | -2.94\* | -2.84 | -3.51 | -1.01 | -0.78 | -0.48 | -0.15 | -1.93 | -1.56 | -1.20 | -0.72 | -0.20 | -0.10 | 0.37 | 0.67 |
| Food | -1.85 | -1.90 | -1.93 | -1.94 | -2.82\* | -2.52\* | -2.40\* | -2.48\* | 0.12 | 1.24 | 3.37 | 3.81 | -2.95\* | -2.41 | -2.31 | -2.59 | 5.17 | 6.25 | 7.57 | 9.40 | -1.90 | -1.34 | -0.13 | -0.40 |
| Mach | 4.11 | 4.06 | 4.04 | 4.02 | -2.00 | -1.23 | -1.36 | -1.36 | -4.19 | -5.04\* | -5.66\* | -5.38 | -0.67 | 0.16 | 0.26 | 0.75 | 0.62 | 2.66 | 3.30 | 3.67 | 0.35 | 0.93 | 0.88 | 0.84 |
| Med | -1.10 | -1.14 | -1.17 | -1.19 | -1.97 | -1.90 | -1.93 | -1.56 | -5.70 | -6.03 | -5.89 | -6.34 | -1.02 | -1.09 | -1.04 | -1.76 | 2.27 | 3.89\* | 5.08\* | 4.87\* | 1.13 | 1.13 | 1.47 | 1.24 |
| Metal | 1.23 | 1.18 | 1.15 | 1.14 | -2.98\* | -2.50\* | -2.11 | -2.43 | -7.64\* | -7.31 | -7.56 | -7.85 | 2.16 | 2.07 | 3.57 | 3.81 | -4.77 | -4.87 | -5.20 | -4.83 | -4.27 | -4.19 | -4.38 | -4.48 |
| Metpr | 3.26\* | 3.21\* | 3.19\* | 3.17\* | -1.00\* | -0.90 | -0.20 | -0.42 | -1.17 | -1.08 | -1.22 | -1.34 | 1.72 | 2.56 | 3.97\* | 4.62\* | -0.64 | -0.08 | -0.25 | 0.38 | 2.64 | 2.76 | 3.90\* | 3.94\* |
| Misc | 2.22 | 2.17 | 2.14 | 2.13 | -1.10\* | -1.05 | -0.98 | -1.28 | -1.41 | -1.25 | -1.81 | -2.05 | 2.14 | 3.24 | 3.84 | 4.12 | -0.36 | -0.18 | -0.12 | 0.96 | -1.98 | -2.21 | -2.34 | -2.37 |
| Oil | -0.52 | -0.57 | -0.59 | -0.61 | -1.83\* | -1.82\* | -1.80\* | -1.65 | -5.86 | -5.73 | -6.06 | -6.11 | 0.37 | 0.55 | 1.02 | 1.73 | 2.10 | 2.61 | 3.02 | 3.61 | 0.19 | 0.23 | 0.14 | 0.21 |
| Paper | -1.67 | -1.72 | -1.74 | -1.76 | -1.17 | -0.74 | -0.38 | -0.13 | 0.93 | 0.13 | 0.88 | 0.34 | -0.58 | -0.52 | 0.38 | 0.65 | -4.47\* | -4.01\* | -3.42 | -3.93\* | -3.60\* | -3.93\* | -3.25\* | -3.54\* |
| Print | -0.31 | -0.36 | -0.38 | -0.40 | -0.42 | -0.18 | -0.13 | -0.18 | -1.57 | 2.70 | 0.18 | 1.22 | 1.08 | 1.53 | 2.50 | 3.20 | 1.88 | 2.18 | 2.24 | 2.31 | -1.95 | -2.08 | -2.22 | -2.06 |
| Recr | -2.61 | -2.66 | -2.69 | -2.70 | -2.82\* | -2.13\* | -1.78 | -1.32 | 4.30 | 5.43 | 5.75 | 6.52 | -1.74 | -1.27 | -0.82 | -0.47 | 4.39 | 5.38 | 6.81\* | 8.22\* | -2.14\* | -2.14\* | -2.12\* | -2.00 |
| Rest | -1.17 | -1.22 | -1.25 | -1.26 | 0.73 | 0.89 | 0.97 | 1.58 | -5.81 | -7.99\* | -8.53\* | -7.80 | -1.68 | -1.23 | -0.77 | -0.46 | -1.98 | -2.19 | -1.68 | -2.37 | -1.63 | -1.93 | -2.10 | -2.47 |
| Ret | 0.18 | 0.14 | 0.11 | 0.10 | -2.70\* | -2.45\* | -2.09\* | -2.25\* | -6.13\* | -5.84\* | -5.70\* | -5.33 | -0.09 | 0.34 | 0.96 | 0.93 | -1.59 | -1.07 | -1.20 | -0.48 | -1.84 | -1.39 | -1.46 | -2.02 |
| Serv | 0.34 | 0.29 | 0.27 | 0.25 | 1.06 | 1.59 | 1.47 | 1.49 | 1.59 | 1.17 | 1.95 | 2.34 | 0.64 | 1.51 | 1.80 | 2.05 | -0.65 | -0.71 | -0.67 | -0.69 | 1.29 | 1.91 | 1.80 | 2.42 |
| Text | -0.89 | -0.93 | -0.96 | -0.98 | 11.04 | 12.13 | 12.61 | 13.18 | -0.69 | -0.36 | -1.44 | -1.45 | 1.14 | 1.55 | 1.45 | 1.82 | 0.87 | 1.44 | 1.52 | 1.95 | -0.08 | 0.03 | -0.50 | -0.73 |
| Trans | -4.56 | -4.60 | -4.63 | -4.65 | -2.68\* | -2.96\* | -2.15 | -2.42 | -1.85 | -1.67 | -1.68 | -0.88 | 0.63 | 1.29 | 3.44 | 3.08 | -3.83 | -4.56 | -4.78 | -5.49 | -3.67 | -3.87 | -3.58 | -5.21 |
| Util | 2.56 | 2.51 | 2.49 | 2.47 | 2.80 | 3.19 | 3.17 | 3.18 | 1.10 | -0.03 | 1.80 | 3.10 | 1.62 | 2.18 | 2.77 | 3.18 | -0.50 | -0.30 | 0.37 | 0.90 | 3.44 | 4.07 | 4.62 | 4.77 |
| Whole | 1.08 | 1.04 | 1.01 | 1.00 | 0.54 | 0.70 | 0.71 | 0.57 | -2.03 | -2.23 | -2.66 | -2.85 | 1.02 | 1.98 | 2.75 | 3.70 | -0.05 | -0.07 | 0.27 | 0.68 | 2.94 | 3.22 | 3.48 | 3.81 |

**Appendix Table 6b: Annualized momentum strategy returns by industry for the Asia/Pacific stock markets**

The reported returns are the annualized contribution of each industry portfolio to the momentum returns of the WmL strategy. That is, we go long (short) on the industry portfolio according to its classification in the winner (loser) quintile. If the industry portfolio is not classified in either of the two quintiles its returns are dropped for that month. Statistically significant returns at the 5% level of significance based on Newey-West robust errors are reported with an asterisk.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | All industries portfolios | | | | Industry portfolios based on top 20% capitalized stocks | | | | Industry portfolios based on bottom 20% capitalized stocks | | | | Chiang Mai Initiative countries stock markets industry portfolios | | | | | Non-Chiang Mai Initiative countries stock markets industry portfolios | | | | ASEAN countries stock markets industry portfolios | | | |
|  | 1 | 6 | 9 | 12 | 1 | 6 | 9 | 12 | 1 | 6 | 9 | 12 | | 1 | 6 | 9 | 12 | 1 | 6 | 9 | 12 | 1 | 6 | 9 | 12 |
| Aero | -1.97 | -1.15 | -5.85 | -2.14 | -2.01 | -1.50 | -4.24 | -3.32 | -0.79 | -0.74 | 0.54 | -4.22 | | 1.24 | -1.32 | -4.97 | -4.50 | -1.30 | -5.87 | -4.69 | -8.24 | -6.05 | 0.38 | -2.52 | 0.82 | |
| Auto | -0.16 | -3.52 | -5.23 | -5.87\* | -0.57 | -2.57\* | -5.22\* | -4.77\* | -0.69 | -0.20 | -1.76 | -2.38 | | -0.58 | -2.85 | -4.15 | -4.50\* | -2.03 | -0.61 | -8.75 | -7.70 | -0.22 | 3.10 | -0.10 | 2.29 | |
| Banks | -1.55 | -2.18 | -3.34 | -3.26 | 0.50 | -1.41 | -0.67 | -0.81 | -2.22 | -1.24 | -0.87 | 0.12 | | -1.20 | -1.07 | -2.90 | -1.80 | -0.91 | -2.19 | -1.02 | 2.54 | -4.84\* | -1.55 | -2.76 | 0.20 | |
| Bev | 2.61 | -0.21 | 0.17 | -1.90 | 0.70 | 0.50 | -0.45 | -1.38 | 5.51 | 4.04 | 5.99 | 8.91 | | 1.44 | -1.97 | -0.03 | -2.71 | 8.34 | 7.72 | 5.15 | 15.06 | -5.36\* | -0.38 | -2.18 | -2.01 | |
| Chem | 0.17 | -2.82 | -2.95 | -3.61 | -2.68 | -5.32\* | -4.80\* | -3.33 | -3.06 | -2.85 | -2.82 | 1.22 | | 0.15 | -2.33 | -2.07 | -2.82 | 7.80\* | 0.54 | -1.98 | 3.34 | -2.32 | 4.22 | 1.29 | 0.77 | |
| Con | 0.22 | -2.29 | -4.64 | -4.87 | 0.67 | -2.63 | -3.68\* | -3.04 | -4.25\* | -0.25 | 2.85 | 1.73 | | 0.12 | -1.60 | -3.82 | -4.33 | 1.79 | 1.38 | -3.38 | -0.19 | 2.30\* | 4.61\* | 2.20\* | 3.14 | |
| Div | 1.39 | -0.12 | -1.37 | -0.11 | 0.63 | -0.77 | 0.89 | 1.10 | -1.68 | -0.92 | 0.75 | 5.34 | | 1.07 | 2.04 | 0.71 | 3.17 | 0.76 | -1.57 | -3.25 | -4.73 | -5.77\* | -5.74\* | -2.57 | 0.23 | |
| Drug | -1.52\* | -3.55\* | -1.31 | 0.05 | -1.85 | -0.84 | -0.92 | 1.59 | -6.13\* | -12.77\* | -10.69\* | 1.00 | | -2.38 | -4.21\* | -3.67\* | -2.41 | -2.00 | -2.17 | -2.05 | 2.18 | -3.22 | -3.65 | -4.86 | -1.37 | |
| Elec | -0.82 | -2.51 | -1.52 | -1.86 | -2.67 | -3.02 | -2.98\* | -4.33\* | -2.31 | 4.16 | 5.38 | 10.69 | | -1.00 | -0.65 | 0.93 | 0.32 | 14.44 | 13.03 | 3.08 | 15.10 | 1.88 | -0.06 | 2.17 | -3.43 | |
| Electr | -0.89 | -2.03 | -1.15 | -1.43 | -1.22 | -2.02 | -0.23 | -1.02 | 0.55 | -1.07 | -0.93 | -0.41 | | -0.39 | -1.06 | 0.12 | -0.31 | 6.00\* | 5.16 | -1.38 | -12.05 | -1.08 | -0.46 | -0.60 | -2.91 | |
| Fin | 1.45 | -2.79 | -4.68 | -4.53 | 1.48 | -2.43 | -3.22 | -2.00 | 2.20 | -0.07 | 7.21\* | 6.83 | | 1.31 | -0.87 | -3.28 | -2.55 | 3.76 | -0.13 | -1.55 | -1.80 | 1.73 | 1.70 | -0.42 | -1.13 | |
| Food | 0.00 | -1.09 | -0.82 | -0.86 | -1.58 | -2.67 | -2.17 | -0.68 | 0.28 | 2.76 | 0.92 | 0.95 | | 0.93 | -0.55 | 0.49 | 0.00 | 0.68 | 2.19 | 2.90 | -3.42 | 0.72 | 0.96 | 0.09 | 1.39 | |
| Mach | 1.77 | -2.19 | -2.32 | -1.69 | -2.53 | -2.48 | -2.76 | -1.98 | -3.65 | -2.80 | -5.00\* | -4.51 | | 1.36 | -1.90 | -1.69 | -1.02 | 9.54\* | 4.03 | 2.49 | 5.14 | 1.56 | 3.10\* | 0.59 | 3.83 | |
| Med | 0.51 | -1.37 | -3.17 | -5.42\* | -2.06 | -2.55 | -3.58 | -6.24\* | -0.48 | 3.83 | 3.28 | 3.61 | | 0.20 | -0.89 | 0.02 | -3.80 | 7.42\* | 0.99 | -5.44 | -3.79 | 3.33 | 4.62 | 0.71 | 2.65 | |
| Metal | -1.01 | -2.52 | -3.20 | -0.56 | 3.82 | 4.21 | 1.24 | 1.01 | -5.68\* | -3.38 | -2.92 | -0.29 | | 0.75 | -4.41\* | -2.50 | -2.00 | 4.44\* | 5.95\* | 8.26\* | 5.51 | -1.62 | -1.84 | -5.47 | -5.09 | |
| Metpr | 2.01 | -0.31 | -3.24 | -4.74 | 0.82 | -1.78 | -2.40 | -3.29 | -1.91 | -4.27 | -1.12 | 2.45 | | 1.36 | 0.51 | -1.65 | -2.50 | 5.68 | 7.28 | 6.64 | 5.34 | 1.96 | -0.71 | -2.89 | -5.36\* | |
| Misc | -4.22 | -0.05 | 0.81 | 5.55 | -0.35 | 0.36 | 1.39 | 2.84 | -6.41\* | -6.94 | -7.63 | -8.41 | | -4.22 | -0.05 | 0.81 | 5.55 | -3.13\* | -2.91\* | -2.87\* | -2.91\* | -4.77\* | -1.36 | -0.31 | 5.67 | |
| Oil | -2.09 | 6.49 | 0.68 | -0.29 | -2.54 | -0.75 | -1.41 | -2.69 | -1.69 | -13.47 | -3.48 | 13.32 | | 0.05 | 7.58 | 2.98 | 1.67 | 8.01\* | 8.06 | 9.75\* | 10.54 | -4.61 | 2.36 | 11.36\* | -3.42 | |
| Paper | -0.08 | -2.85 | -0.94 | -3.54 | -2.62 | -4.30\* | -2.93\* | 0.55 | -0.47 | -3.99 | -8.40 | -6.92 | | -0.72 | -3.18 | -0.49 | -3.12 | -8.47\* | -3.96 | -5.01 | -0.66 | -1.76 | -3.03 | -3.07 | -0.93 | |
| Rest | -0.95 | -0.37 | 0.85 | 0.59 | -0.32 | -0.02 | 1.39 | 2.09 | -0.50 | 2.95 | 0.64 | 2.34 | | -0.47 | 0.81 | 1.87 | 1.92 | 1.88 | 3.46 | 3.20 | 1.83 | 0.05 | 1.85 | 0.24 | 0.43 | |
| Recr | -0.51 | -2.76 | -3.65\* | -3.48\* | -1.47 | -2.48\* | -4.06\* | -1.15 | -3.04 | -1.75 | 0.45 | 2.05 | | -0.27 | -1.31 | -2.35 | -2.23 | 1.77 | -0.46 | -4.98 | -3.10 | -3.50 | -3.17 | -0.56 | -1.10 | |
| Ret | 2.95 | -0.04 | -1.19 | -1.50 | 1.42 | -0.43 | -1.88 | 0.32 | 0.27 | 1.31 | 3.70 | -0.71 | | 3.41\* | 0.48 | -0.43 | -1.23 | 0.29 | -3.33 | 0.40 | 2.81 | 3.77 | 1.64 | 2.96 | 4.78 | |
| Serv | 1.44 | -3.26 | -1.79 | -0.62 | 0.25 | -0.78 | -1.63 | 1.05 | -0.97 | -0.26 | -1.79 | 4.43 | | 2.29 | -2.40 | -1.11 | -0.76 | -1.66 | -3.29 | -8.23 | 2.22 | 4.58\* | 3.64 | -5.15 | 0.95 | |
| Trans | -0.36 | -3.93 | -4.36\* | -1.69 | -1.67 | -5.10\* | -4.50 | -0.03 | -1.72 | -3.78 | -1.65 | 0.46 | | -1.21 | -4.49\* | -3.01 | -1.20 | 0.30 | -0.30 | -1.39 | 1.15 | -0.32 | -1.22 | -1.21 | -3.00 | |
| Util | 0.59 | 0.44 | -0.31 | 1.02 | -0.07 | -0.71 | -0.52 | -1.74 | -9.70 | -2.49 | -1.11 | -5.10 | | -0.14 | 0.96 | 0.50 | -0.26 | 1.04 | -2.46 | -6.59 | -5.31 | 0.62 | -0.09 | 2.31 | -0.60 | |

**Appendix Table 6c: Annualized momentum strategy returns by industry for the U.S. stock markets**

The reported returns are the annualized contribution of each industry portfolio to the momentum returns of the WmL strategy. That is, we go long (short) on the industry portfolio according to its classification in the winner (loser) quintile. If the industry portfolio is not classified in either of the two quintiles its returns are dropped for that month. Statistically significant returns at the 5% level of significance based on Newey-West robust errors are reported with an asterisk.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | All industries portfolios | | | | Industry portfolios based on top 20% capitalized stocks | | | | Industry portfolios based on bottom 20% capitalized stocks | | | | NYSE industry portfolios | | | | | | NASDAQ industry portfolios | | | | | | | |
|  | 1 | 6 | 9 | 12 | 1 | 6 | 9 | 12 | 1 | 6 | 9 | 12 | 1 | 6 | 9 | | 12 | | 1 | 6 | | 9 | | 12 | |
| Basic | -2.27 | -0.42 | -1.78 | -4.09 | -0.69 | 2.42 | 3.97 | 0.38 | -1.12 | 1.89 | 2.79 | 3.74 | -2.72 | 1.99 | | 3.79 | | -2.83 | 0.28 | | 2.62 | | 2.16 | | -6.47 | |
| Cap | -3.50\* | -3.17 | 0.73 | -3.55 | -1.96 | -2.83 | -3.32 | -5.15 | -1.20 | -2.11 | -4.15 | -4.61 | -2.72 | -1.36 | | -2.52 | | -4.87 | -1.87 | | 3.03 | | -1.26 | | -1.15 | |
| Consd | 0.92 | 0.98 | -3.56 | -1.52 | -1.59 | -0.71 | -1.17 | -0.38 | -2.94 | -9.53\* | -5.50 | -6.17 | -2.71 | -0.40 | | -0.25 | | -3.13 | 0.26 | | 1.08 | | -4.84 | | 2.81 | |
| Consnd | -6.29\* | 4.85 | 4.23 | 2.10 | -4.18 | 2.73 | -2.01 | -4.31 | -3.46\* | -3.41 | -4.18\* | -2.62 | -3.51 | 2.95 | | 3.61 | | 4.74 | -6.84\* | | 0.17 | | -1.80 | | -3.88 | |
| Cons | -1.99 | -2.76 | -3.92 | 0.07 | 0.35 | 0.71 | -3.32 | 1.48 | 1.60 | 3.53 | 5.04 | -3.01 | -0.40 | -2.12 | | -0.11 | | 1.73 | -2.71 | | -1.03 | | -5.87 | | -0.31 | |
| Ene | -8.01\* | -7.59\* | 7.57\* | 2.74 | 0.60 | -0.79 | -0.27 | 2.68 | 1.41 | 1.38 | 3.37 | 11.92 | -1.35 | -1.89 | | 0.54 | | 5.35\* | -4.17 | | -6.23 | | -5.42 | | -2.30 | |
| Fin | -3.47 | -3.74 | -3.16 | -5.68 | -2.70 | -3.62 | -5.51\* | -7.70\* | 4.80 | 5.95\* | -0.02 | -0.44 | -3.37 | -1.54 | | -0.89 | | -3.57 | -2.83 | | -5.43 | | -4.76\* | | -6.65 | |
| Health | -3.19\* | -1.38 | -0.67 | -0.47 | -3.57 | -1.58\* | -0.93 | -1.34 | -4.57\* | 3.72 | -1.44 | -0.64 | -1.69 | -1.39\* | | -0.40 | | 0.11 | -2.02 | | -0.23 | | -1.83 | | 3.69 | |
| Misc | 0.37 | -1.02 | -8.57\* | -9.49\* | 0.84 | 0.05 | 3.62 | 1.23 | 3.45 | -0.10 | 0.97 | -12.35 | 0.13 | 0.01 | | -0.93 | | -3.74 | 3.91 | | -4.69 | | -8.79 | | -0.50 | |
| Various | -1.96 | -1.03 | -1.75 | -3.25\* | -2.87\* | -2.74 | -4.56\* | -2.21 | -2.68 | -4.37 | -8.31\* | -7.79\* | -1.39 | -2.16\* | | -2.35\* | | -3.31\* | 0.26 | | -1.40 | | -1.69 | | -2.22 | |
| PU | -6.41\* | -6.06\* | -9.41\* | -6.31\* | -5.39\* | -6.58\* | -8.11\* | -4.89 | -3.03 | -2.68 | -0.89 | -2.25 | -6.52\* | -3.47 | | -3.17 | | 0.84 | -5.63 | | -12.12\* | | -14.86\* | | -15.67\* | |
| Tech | -3.33 | -2.34 | -3.10 | -5.76 | -4.20\* | -1.08 | -1.66 | -4.59 | 7.39 | 8.80 | 0.64 | -0.36 | -1.20 | -2.76 | | -3.83\* | | -6.93\* | -8.03\* | | 1.48 | | -6.58 | | -6.09 | |
| Trans | -1.40 | -5.74\* | -7.43\* | -0.27 | -2.92\* | -2.42 | -1.86 | -2.17 | -4.09\* | -0.80 | -2.00 | -3.24\* | -0.80 | -7.97\* | | -6.33\* | | -4.35 | 1.14 | | 1.88 | | 0.97 | | 0.16 | |

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2. More details can be found in the link: https://www.stoxx.com/index-details?symbol=SXXP [↑](#footnote-ref-2)
3. For the non-Eurozone countries, we transform stock prices in Euros using the exchange rate conversion option provided by Datastream. [↑](#footnote-ref-3)
4. Composite index of the 600 firms of the highest capitalization in 17 European stock markets. [↑](#footnote-ref-4)
5. Composite index of the 600 firms of the highest capitalization in Australia, Hong Kong, Japan, New Zealand and Singapore [↑](#footnote-ref-5)
6. The use of the Dow Jones or the NASDAQ composite index provided quantitatively similar results, due to the high correlation of 0.95 in the sample. The results are available upon request. [↑](#footnote-ref-6)
7. The respective unconditional reversal returns across all other portfolio formation options lead to similar results and are available from the authors upon request. [↑](#footnote-ref-7)
8. The use of top/bottom 20% capitalized industries, or spatial segregation methods in portfolio formation provide quantitative similar results and are available upon request. [↑](#footnote-ref-8)
9. We also run regressions including each industry separately and results remain qualitatively the same. [↑](#footnote-ref-9)
10. The results for the STOXX Asia/Pacific 600 and the Dow Jones Industrial index are not depicted here and are available upon request. [↑](#footnote-ref-10)