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Research Article

Intermediate Industry Momentum: The Global Evidence

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Abstract : Novy-Marx (2012) shows that, in the US, intermediate momentum portfolios formed from individual stocks' performance 12 to seven months prior to the current month significantly outperform portfolios formed on returns from six to two months prior. Industry momentum strategies provide an alternative method to verify the robustness of intermediate momentum. Looking for international evidence of intermediate industry momentum in 23 countries. To find evidence of intermediate industry momentum in only 3 large developed countries. In 20 countries, intermediate industry momentum portfolios do not outperform recent industry momentum portfolios formed on returns from six to two months prior. In several countries, the opposite was true. Intermediate industry momentum is not a worldwide phenomenon. However, in the 3 large developed countries of United States, France, and Germany, intermediate industry momentum portfolios significantly outperform recent industry momentum portfolios.

***Keywords*:** Industry momentum, Intermediate momentum, Information ratios, International financial markets

1. Introduction

"Intermediate momentum" is the observation that, intermediate horizon past performance, measured over the period from 12 to seven months, prior, seems to better predict average returns than does recent past performance. Novy-Marx (2012) was the first paper to document this phenomenon. In the paper, Novy-Marx finds that for US stocks, stocks that have risen the most over the past six months, but performed poorly over the first half of the preceding year, significantly under-perform those stocks that have fallen the most over the past six months but performed strongly over the first half of the preceding year.

Industry momentum strategies, which buy stocks from past winning industries and sell stocks from past losing industries, differ from individual stock momentum strategies formed from screening individual stocks. Whether industry momentum strategies exhibit intermediate momentum in different countries, has not yet been researched. Analysis of industry momentum strategies from a sample of different countries provides an alternative method to verify whether intermediate momentum is robust to alternative momentum portfolio construction methodologies and international data. In this study, we focus on industry momentum strategies with international data. We look for evidence of intermediate industry momentum in a database consisting of 23 different countries.

Our results show evidence of intermediate industry momentum in only 3 large developed countries, United States, France, and Germany. In 20 countries, intermediate industry momentum portfolios do not outperform industry momentum portfolios formed on returns from six to two months prior. In several countries, the opposite was true (industry momentum portfolios formed on returns from six to two months prior, outperform intermediate industry momentum portfolios). In short, our results show that intermediate industry momentum is not a worldwide phenomenon.

The remainder of the paper is organized as follows. Section 2 provides a brief review of related literature. Section 3 describes the data and explains the construction of the industry momentum portfolios analyzed in this paper. Section 4 describes the main tests. Section 5 concludes.

2. Review of Literature

The literature on momentum is vast. However, only a handful of published studies focus specifically on industry momentum. To maintain the focus of this paper, we review these studies only. Moskowitz and Grinblatt (1999) provide the seminal article on industry momentum. They show that industry momentum investment strategies, which buy stocks from past winning industries and sell stocks from past losing industries, are highly profitable, even after controlling for conventional control measures constructed using the entire cross section of US stock returns, such as size, book-to-market equity, individual stock momentum, the cross-sectional dispersion in mean returns, and potential microstructure influences. They show that the strong and prevalent momentum effect in industry components of stock returns accounts for much of the individual stock momentum anomaly. In addition, they demonstrate that traditional individual stock momentum investment strategies, which buy past winning stocks and sell past losing stocks, are significantly less profitable once they control for industry momentum. Pan et al. (2004) using weekly US stock returns from 1962–1998, they find that industry momentum strategies can

generate significant, positive profits, especially for short horizons (less than 4 weeks). Behr et al. (2012) show that enhancing portfolios with industry momentum exposure improves performance. They compare their industry momentum exposure enhanced portfolios to 14 well-known benchmarks and find that it substantially improves the performance of the benchmarks in terms of Sharpe Ratios and certainty equivalents. Misirli (2018) used VAR to find industry momentum return source the total factor productivity (TFP) and can explain the most the cross section induvial stock return, the sample periods span from 1963Q3 to 2013Q4. The winner industry is sensitivity to industry production shock then loser industry. The industry momentum profits are sources their cashflow. Hoberg and Phillips (2018) using the text-based network industry classification (TNIC) to identify peer firms, is different with the traditional Standard Industrial Classification (SIC) method, they find 5 results including that industry momentum returns are stronger are for the 6-month horizon and the subsequent 6-month period. Szakmary and Zhou (2015) used the 1900-1925 sample period to constructed industry momentum portfolio results are same to 1960s periods.

For individual stock momentum portfolios, Goyal and Wahal (2015) do not find evidence of intermediate momentum in countries outside the US between 1991 and 2009. Their study, however, focus only on individual stock momentum, whereby their momentum portfolios are constructed from sorts of individual stock returns. Detailed analysis of whether industry momentum strategies exhibit intermediate momentum in different countries has not yet been done in the literature. This is the goal of this study.

3. Data and industry momentum portfolio construction

We select 23 developed countries and four regions for analysis. The 23 developed countries are classified by MSCI. They are Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Hong Kong, Greece, Ireland, Italy, Japan, Netherlands, New Zealand, Norway, Portugal, Singapore, Spain, Sweden, Switzerland, United Kingdom, and U.S.A. We choose countries with at least 10 sectors of index returns per month and sort these sector returns into terciles. The various MOM(lag,lag) industry momentum strategies are then constructed from the results of these sorts. The sample period spans from February 1973 to March 2017. Because our empirical methodology requires a minimum of 10 industry sectors per month in the dataset, for New Zealand, Hong Kong, and Singapore, the starting dates are February 1973, April 1994, and January 1983, respectively.

In this study, we construct industry momentum strategies each month by buying winners and selling losers based on past performance of the industry sectors for each country, where winners and losers are defined as the upper and lower terciles, of cumulative returns over a test period using the DataStream industry sectors of each country as the investment opportunity set. The (*n,m)* strategy is defined as portfolios sorted on cumulative returns $r_{n,m}$ from *n* to *m* months (inclusive) prior to portfolio formation.$MOM_{n,m}$ denotes both the (*n,m)* strategy and its return series. Under this notational setup, conventional (near horizon) momentum strategies will have smaller m's (i.e. 1 (month)) and intermediate horizon momentum strategies will have larger m's (i.e. 7 (months)). The momentum strategies analyzed in this study are formed by sorting on recent and intermediate horizon past performance. Specifically, for each country, all industry sectors with valid returns are sorted into terciles based on prior returns. The intermediate momentum returns ($MOM_{12,7}$) are based on portfolio sorted on cumulative returns from 12 to 7 month prior to portfolio formation. The recent momentum returns ($MOM_{6,2}$) are based on portfolio sorted on cumulative returns from 6 to 2 month prior to portfolio formation. Strategy returns are equal-weighted and computed using local currency returns.

4. Results

4.1. Descriptive statistics

Table 1 provides a description of the data and some sample statistics. The data consists of 23 developed countries. To be included in the dataset of our analysis, we require at least 10 industry sectors of usable data in a country or region per month. The starting dates of the data range from February 1973 to November 1995. Table 1 shows that over half of the countries have nearly forty years usable of data. The countries with fewer years of usable data are mostly the smaller European countries. The maximum number of observations is 529. The minimum number of observations is 196 (Greece). With the exception of Greece, all other countries have over 200 usable observations. Also shown on the Table are the minimum, medium, and maximum numbers of sectors per month for each country. All of the countries used in this study include at least 10 industry sectors per month. The lowest value for the median is 17 industry sectors per month and the highest value for maximum is 40 industry sectors per month.

4.2. Term structure of industry momentum returns

Table 2 gives the term structure of industry momentum returns for the various countries of this study. Intermediate momentum returns denote returns from a portfolio sorted on cumulative returns from 12 to 7 months prior to portfolio formation. Recent momentum returns denote returns from a portfolio sorted on the cumulative

returns from 6 to 2 months prior to portfolio formation. The momentum spread is computed as intermediate momentum minus recent momentum for each country or regional grouping. Out of the 23 countries, only United States, France, and Germany show statistically significant positive spreads between intermediate momentum and recent momentum (intermediate momentum greater than intermediate momentum). For Germany, the momentum spread between the intermediate and recent momentum strategies was only significant at the 10% level with a t-value of 1.66. For France, the momentum spread was significant at the 5% level with a t-value of 1.87. For the United States, the momentum spread was significant at the 1% level with a t-value of 2.31. On the other hand, the results also show that in four countries Portugal, Sweden, Hong Kong, and Singapore, recent momentum was significantly greater than intermediate momentum, with t-values all below 1.54, except Greece t-values is 2.38.

In summary, Table 2 provides evidence of intermediate industry momentum in only 3 large developed countries, United States, France, and Germany. For Germany, the evidence of intermediate industry momentum is marginal. In the other 20 countries, intermediate industry momentum portfolios do not outperform industry momentum portfolios formed on returns from six to two months prior. In several countries, the opposite was true (industry momentum portfolios formed on returns from six to two months prior, outperform intermediate industry momentum portfolios). In short, the results given by the table suggest that intermediate industry momentum is not a worldwide phenomenon.

4.3. Double Sorted Portfolios

Double sorted portfolios provide a robustness check for the incremental effects of intermediate versus recent returns on momentum. For each country, the industries are sorted into winner and loser terciles based on recent returns, and independently, the same industries are sorted into winner and loser terciles based on intermediate returns. The marginal contribution intermediate industry returns versus the marginal contribution of recent industry returns can be observed from the intersection of these two independent sorts. In effect, double sorting allows us to see the effects of intermediate industry returns while controlling for recent industry returns, and vice-versa.

Panel A of Table 3 shows the industry momentum returns conditional on the winner sorting. For example, in the second column of Panel A, $MOM_{12,7 \mid 6,2}$ shows statistics on post-formation returns for winner intermediate-return minus loser intermediate-return portfolio of stocks in winner recent-return tercile portfolio. Similarly, in the fourth column of Panel A, $MOM_{6,2 \mid 12,7}$ shows statistics on post-formation returns for winner recent-return minus loser recent-return portfolio of stocks in winner intermediate-return tercile portfolio. Panel A shows that France and Germany continue to produce statistically significant positive spreads, but with lower t-values of 1.54 and 1.56, respectively, which correspond to significance at the 10% level. Belgium, Greece, Sweden, Hong Kong and Singapore produce statistically significant negative spreads, with t-values of -1.60, -2.36, -2.11, -2.00 and -2.23, respectively. Panel B shows the corresponding results for the loser sorting. The results for Panel B closely match those of Panel A. When conditioned on the loser sorting, France and Germany continue to produce positive spread at the significance level of 10% or better, with France showing a t-value of 1.62 which approaches the 5% level of statistical significance. Finally, as in

Results of double sorting continue to show that intermediate momentum gives higher returns than recent momentum in only the United States, France, and Germany. However, it is significant at the 10% of statistical significance only for the United States under double sorting. For France and Germany, double sorting reduces the t-values associated with the momentum spreads.

4.4. Spanning tests

Spanning tests allow us to examine whether a test strategy adds significantly to the investment opportunity set. These tests are can be implemented by regressing a test strategy's returns on the returns to one or more explanatory strategies. The information ratio of the test strategy benchmarked to the mimicking portfolio constructed from the various explanatory strategies will be the intercept's test statistic. If the test strategy is inside the span of the explanatory strategies, the intercept will be insignificant. Insignificant intercept means the test strategy does not add significantly to the investment opportunity set. On the other hand, a statistically significant intercept or a high information ratio suggests that adding the test strategy to the investment opportunity set can produce a Sharp ratio that significantly greater that which can be achieved with the explanatory strategies alone.

Table 4 presents the results of the spanning tests for United States, France, and Germany. MOM(1,1) is added to the spanning tests as a control. The table gives the average returns of the intermediate momentum and recent momentum strategies, as well as the results of time series regressions of these strategies' returns on MOM(1,1) and each other. Columns 1 and 4 give the average returns of the intermediate momentum and recent momentum strategies, respectively. For these three countries, columns 1 and 4 show that the intermediate momentum gave higher returns than the recent momentum. Moreover, the returns for intermediate momentum were all statistically

significant. Recent momentum was statistically insignificant for United States. Column 2 shows that for United States, the coefficient for MOM(1,1) is statistically significant at the 10% level, with t-values near 1.7. For France and Germany, the coefficient for MOM(1,1) is significant at the 5% level, with t-values above 2. In short, MOM(1,1) was able to explain some of the returns of the intermediate momentum strategy for United States, France and Germany, but only marginally so for the United States. The significant intercept terms for all countries in column 2 show that intermediate momentum strategy, however, still generate significant abnormal returns relative to MOM(1,1) in all these cases. Column (5) shows the corresponding results for recent momentum. For the recent momentum regressions, the coefficient corresponding to MOM(1,1) are highly significant, with t-values well above 2 for all cases. For United States, recent momentum's returns relative to MOM(1,1) are insignificant. On the other hand, for France and Germany, recent momentum's returns relative to MOM(1,1) is positive and statistically significant (with t-values above 2 for the regression intercept terms). This means that MOM(1,1) was able to explain much of recent momentum's returns, but recent momentum still generates significant returns relative to MOM(1,1) for France and Germany. The regression intercept terms in columns 3 and 6 show that for these three countries, intermediate momentum strategy has a large, highly significant information ratio relative to the recent momentum strategy, while the recent momentum strategy has a completely insignificant information ratio relative to the intermediate momentum strategy. Column 3, for example, shows that even though recent moment was significant in explaining intermediate momentum's returns, the statistically significant intercept terms in the regressions show that the intermediate momentum strategy, however, still generates significant returns relative to recent momentum returns. This was not the case when recent momentum was regressed on intermediate momentum. Column 6 shows that when recent momentum was regressed on intermediate momentum, intermediate momentum was able to explain most of recent momentum's returns in all cases with highly significant t-values, but the insignificant intercept terms in the regressions show that recent the recent momentum strategy was unable to generate significant returns relative to intermediate momentum returns. Taken as a whole, the regression results of Table 4 show that for United States, France, and Germany, the intermediate momentum strategy has a large, highly significant information ratio relative to the recent momentum strategy while the recent momentum strategy has insignificant information ratio relative the intermediate momentum strategy.

5. Conclusion

Novy-Marx (2012) shows that, in the US, intermediate momentum portfolios formed from individual stocks' performance 12 to seven months prior to the current month significantly outperform portfolios formed on returns from six to two months prior. Industry momentum strategies, which buy stocks from past winning industries and sell stocks from past losing industries, differ from individual stock momentum strategies formed from screening individual stocks. Whether industry momentum strategies exhibit intermediate momentum in different countries, has not been researched. Our results show evidence of intermediate industry momentum in only 3 large developed countries, United States, France, and Germany. In 20 countries, intermediate industry momentum portfolios do not outperform industry momentum portfolios formed on returns from six to two months prior. In several countries, the opposite was true (industry momentum portfolios formed on returns from six to two months prior, outperform intermediate industry momentum portfolios). In short, our results show that intermediate industry momentum is not a worldwide phenomenon. However, in the 3 large developed countries of United States, France, and Germany, where intermediate industry momentum was present, intermediate industry momentum portfolios were found to significantly outperform recent industry momentum portfolios under a variety of measures.

References

1. P. BEHR, A GUETTLER, F. TRUEBENBACH: Using Industry Momentum to Improve Portfolio Performance. Journal of Banking and Finance **36**(5), 1414 (2012).
2. A. GOYAL, S. WAHAL: Is Momentum an Echo? Journal of Financial and Quantitative Analysis **50**(6), 1237 (2015).
3. G. HOERG, G. M. PHILLIPS: Text-Based Industry Momentum. Journal of Financial and Quantitative Analysis **53**(6), 2355 (2018).
4. E. U. MISIRLI: Productivity Risk and Industry Momentum. Financial Management **47**(3), 739 (2018).
5. T. J. MOSKOWITZ, M. GRINBLATT: Do Industries Explain Momentum? The Journal of Finance **54**(4), 1249 (1999).
6. R. NOVY-MARX: Is Momentum Really Momentum? Journal of Financial Economics **103**(3), 429 (2012).
7. M. S.PAN, K. LIANO, G. C. HUANG: Industry Momentum Strategies and Autocorrelations in Stock Returns. Journal of Empirical Finance **11**(2), 185 (2004).
8. A. C. SZAKMARY, X. ZHOU: Industry Momentum in an Earlier Time: Evidence from The Cowles Data.

Journal of Financial Research **38**(3), 319 (2015) **Table 1:** Description of Data and Sample Statistics

This table provides a description of the data and some sample statistics. The data consists of 23 developed countries. To be included in the dataset of our analysis, we require at least 10 industry sectors of usable data in a country or region per month. The second column lists the starting date of the data. The third column lists the number of observations. The rightmost three columns show the minimum, medium, and maximum number of sectors per month for each country. All of the countries used in this study include at least 10 industry sectors per month.
The sample period spans from February 1973 to March 2017

Country	Staring Date Used	No. of obs.	Sectors/Month		
			Min	Median	Max
United States	Feb-73	529	38	38	40
Canada	Feb-73	529	17	34	37
Austria	Nov-91	304	10	16	20
Belgium	Feb-73	529	12	18	27
Denmark	Jul-83	404	10	18	22
Finland	Apr-88	347	10	24	26
France	Feb-73	529	19	35	40
Germany	Feb-73	529	21	32	40
Greece	Nov-95	256	10	20	21
Ireland	Aug-86	367	10	16	18
Italy	Feb-73	529	14	28	35
Netherlands	Feb-73	529	18	25	31
Norway	Feb-90	325	10	15	19
Portugal	Feb-90	325	12	21	23
Spain	Mar-87	360	15	29	32
Sweden	Dec-88	339	11	23	26
Switzerland	Feb-73	529	13	27	30
United Kingdom	Feb-73	529	32	38	40
Japan	Feb-73	529	28	33	40
Australia	Feb-73	529	17	23	31
New Zealand	Apr-94	275	10	18	22
Hong Kong	Jun-88	345	11	26	32
Singapore	Jan-83	410	11	29	35

Table 2: The Term Structure of Momentum Returns
This table shows the term structure of industry momentum returns for the various countries analyzed. Intermediate momentum returns denote returns from a portfolio sorted on cumulative returns from 12 to 7 months prior to portfolio formation. Recent momentum returns denote returns from a portfolio sorted on the cumulative returns from 6 to 2 months prior to portfolio formation. The momentum spread is computed as the difference between intermediate momentum and recent momentum for each country. The sample period spans from February 1973 to March 2017. The t-values are calculated with the Newey-West correction for autocorrelation and heteroscedasticity with four monthly lags. SR denotes the Sharpe ratio.

Country	Intermediate Momentum Returns			Recent Momentum Returns			Momentum Spread	
	$MOM_{12,7}$	t-value	SR	$MOM_{6,2}$	t-value	SR	Difference	t-value
United States	0.224	2.79	0.819	0.033	0.56	0.169	0.191	2.31
Canada	0.200	2.24	0.634	0.150	2.29	0.634	0.050	-0.31
Austria	0.100	0.57	0.238	0.113	0.98.	0.381	-0.013	-0.26
Belgium	0.207	2.15	0.624	0.201	2.61	0.775	0.006	-0.62
Denmark	0.217	0.98.	0.371	0.232	2.54	0.761	-0.015	-0.93.
Finland	0.163	1.01	0.426	0.184	1.65	0.595	-0.021	-0.17
France	0.300	2.88	0.920	0.108	1.78	0.467	0.192	1.87
Germany	0.310	3.05	0.934	0.099	1.70	0.446	0.211	1.66
Greece	-0.155	-0.13	-0.254	0.391	1.99	0.891	-0.546	-2.38
Ireland	0.334	0.40	0.528	0.225	1.43	0.527	0.109	0.15
Italy	0.308	2.94	0.804	0.207	2.63	0.751	0.101	0.11
Netherlands	0.237	2.03	0.620	0.154	2.60	0.727	0.083	-0.31
Norway	0.042	0.24	0.095	0.002	0.03	0.010	0.040	0.08
Portugal	0.104	0.53	0.175	0.200	1.56	0.573	-0.096	-0.86.
Spain	0.225	1.28	0.439	0.095	1.28	0.450	0.130	0.14
Sweden	0.186	0.95.	0.373	0.223	3.15	1.152	-0.037	-1.82
Switzerland	0.210	2.06	0.664	0.141	3.21	0.889	0.069	-0.73
United Kingdom	0.050	0.75.	0.213	0.078	1.51	0.454	-0.028	-0.78
Japan	0.093	0.94.	0.274	0.025	0.51	0.139	0.068	0.43
Australia	0.200	2.26	0.624	0.184	2.84	0.714	0.016	-0.23
New Zealand	0.177	1.21	0.464	0.156	1.23	0.429	0.021	-0.11
Hong Kong	-0.121	-0.41	-0.173	0.159	1.68	0.575	-0.280	-1.68
Singapore	-0.006	-0.14	-0.044	0.126	1.81	0.658	-0.132	-1.76

Table 3: Double-Sorted Momentum Returns and Spreads
Double sorting allows us to see the effects of intermediate industry returns while controlling for recent industry returns, and vice-versa. For each country, the industries are sorted into winner and loser terciles based on recent returns, and independently, the same industries are sorted into winner and loser terciles based on intermediate returns. The marginal contribution intermediate industry returns versus the marginal contribution of recent industry returns can be observed from the intersection of these two independent sorts. Panel A shows the industry momentum returns conditional on the winner sorting. For example, in the second column of Panel A, $MOM_{12,7 \mid 6,2}$ shows statistics on post-formation returns for winner intermediate-return minus loser intermediate-return portfolio of stocks in winner recent-return tercile portfolio. Similarly, in the fourth column of Panel A, $MOM_{6,2 \mid 12,7}$ shows statistics on post-formation returns for winner recent-return minus loser recent-return portfolio of stocks in winner intermediate-return tercile portfolio. Panel B shows the corresponding results for the loser sorting. The sixth column shows the difference between the second and fourth columns. The t-values are calculated with the Newey-West correction for autocorrelation and heteroscedasticity with four monthly lags. The sample period spans from February 1973 to March 2017

Panel A: Momentum returns for winners.

Country					Momentum	Spreads
	$MOM_{12,7 \mid 6,2}$	t-value	$MOM_{6,2 \mid 12,7}$	t-value	Difference	t-value
United States	0.198	2.99	0.056	0.71	0.142	2.21
Canada	0.153	1.97	0.270	2.61	-0.116	-1.00
Austria	0.090	0.58	0.217	1.21	-0.127	-0.04
Belgium	0.152	1.70	0.339	2.78	-0.187	-1.60
Denmark	0.139	1.14	0.351	2.47	-0.212	-1.32
Finland	0.153	1.10	0.246	1.43	-0.093	-0.10
France	0.240	3.09	0.160	1.98	0.080	1.54

Germany	0.304	4.13	0.180	2.02	0.124	1.56
Greece	-0.089	-0.42	0.606	1.97	-0.695	-2.36
Ireland	0.291	1.61	0.384	1.56	-0.094	-0.10
Italy	0.283	3.23	0.291	2.24	-0.008	0.34
Netherlands	0.145	1.45	0.295	2.60	-0.151	-1.08
Norway	-0.029	-0.17	-0.012	-0.06	-0.016	-0.13
Portugal	0.152	0.97	0.265	1.14	-0.113	-0.21
Spain	0.185	1.27	0.208	1.36	-0.024	-0.05
Sweden	0.158	0.94	0.584	3.14	-0.427	-2.11
Switzerland	0.163	1.82	0.329	3.17	-0.166	-1.33
United Kingdom	0.032	0.43	0.144	1.52	-0.113	-1.21
Japan	0.078	0.93	0.074	0.68	0.004	0.20
Australia	0.166	2.29	0.228	2.76	-0.064	-0.41
New Zealand	0.174	1.39	0.275	1.42	-0.055	-0.36
Hong Kong	-0.129	-0.48	0.378	1.43	-0.507	-2.00
Singapore	-0.067	-0.77	0.278	1.61	-0.345	-2.23

Panel B: momentum returns for losers.

Country					Momentum	Spreads
	$MOM_{12,7 \mid 6,2}$	t-value	$MOM_{6,2 \mid 12,7}$	t-value	Difference	t-value
United States	0.219	2.72	0.014	0.22	0.205	2.33
Canada	0.204	2.43	0.162	2.02	0.042	0.11
Austria	0.072	0.42	0.092	0.70	-0.020	-0.14
Belgium	0.116	1.63	0.273	2.91	-0.107	-1.60
Denmark	0.111	0.78	0.249	2.18	-0.137	-1.11
Finland	0.135	0.88	0.276	1.91	-0.141	-0.78
France	0.290	2.96	0.133	1.71	0.157	1.62
Germany	0.286	3.08	0.125	1.62	0.161	1.59
Greece	-0.151	-0.62	0.493	2.00	-0.644	-2.56
Ireland	0.205	0.91	0.269	1.33	-0.064	-0.34
Italy	0.292	2.82	0.266	2.85	-0.026	-0.21
Netherlands	0.234	1.99	0.249	2.72	-0.015	-0.48
Norway	-0.004	-0.02	0.024	0.15	-0.028	-0.27
Portugal	0.123	0.68	0.316	1.90	-0.193	-0.93
Spain	0.253	1.53	0.161	1.26	0.092	0.27
Sweden	0.086	0.45	0.509	3.26	-0.423	-2.97
Switzerland	0.190\	1.81	0.269	3.15	-0.078	-1.28
United Kingdom	0.096	1.18	0.096	1.31	-0.000	-0.14
Japan	0.053	0.55	0.054	0.61	-0.001	-0.11
Australia	0.183	2.06	0.204	2.89	-0.020	-0.60

New Zealand	0.118	0.78	0.190	1.53	-0.073	-0.86
Hong Kong	-0.092	-0.28	0.364	1.70	-0.456	-1.81
Singapore	-0.010	-0.07	0.281	2.08	-0.291	-2.23

Table 4: Industry Momentum Strategy Spanning Tests for United States, France, and Germany
This table presents the estimated results of time series regressions using the returns of various industry momentum strategies constructed using past performance over different horizons. $MOM_{n,m}$denotes the returns to the industry momentum strategies constructed by buying winners and selling losers based on past performance of the industry sectors for the respective country, where winners and losers are defined as the upper and lower tertiles, of cumulative returns $r_{n,m}$from *n* to *m* months (inclusive) prior to portfolio formation.

Independent	$MOM_{12,7}$ as dependent variable			$MOM_{6,2}$ as dependent variable		
variable	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: United States						
Intercept	0.224	0.245	0.254	0.033	0.034	-0.043
	(2.79)	(3.33)	(3.14)	(0.56)	(0.31)	(-0.84)
$MOM_{1,1}$		0.132			0.154	
		(1.54)			(2.12)	
$MOM_{6,2}$			0.293			
			(3.83)			
$MOM_{12,7}$						0.297
						(3.43)
Adj. R^2		0.023	0.145		0.033	0.119
Panel B: France						
Intercept	0.300	0.343	0.292	0.108	0.179	0.059
	(2.88)	(3.52)	(3.16)	(1.78)	(2.04)	(0.98)
$MOM_{1,1}$		0.160			0.221	
		(2.55)			(2.61)	
$MOM_{6,2}$			0.286			
			(4.05)			
$MOM_{12,7}$						0.291
						(3.41)
Adj. R^2		0.023	0.112		0.068	0.112
Panel C: Germany						
Intercept	0.310	0.365	0.336	0.099	0.241	0.120
	(3.05)	(3.63)	(3.39)	(1.70)	(2.01)	(1.33)
$MOM_{1,1}$		0.148			0.276	
		(2.01)			(2.70)	
$MOM_{6,2}$			0.159			
			(2.11)			
$MOM_{12,7}$						0.195

					(2.34)
Adj. R^2	0.028	0.031		0.071	0.031