

# “The origin of short-term momentum effects’ profits”

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## The origin of short-term momentum effects' profits

### Abstract

In the field of financial literature, many scholars have tried to solve the riddle of origin of momentum profits. But results are so far mixed and not ultimate. The purpose of this paper is to find the origin of short term momentum effect. For this purpose, a new set of variables has been chosen that comes under the classification of "Business Proxies". Fourteen stock markets from around the globe have been chosen to find the origin. These markets are Argentina, Austria, Brazil, China, Chile, Greece, India, Italy, Ireland, Mexico, New Zealand, Pakistan, Turkey and the USA. It is found that, out of 4 independent variables, a variable SB (Starting a Business) has proved to be significant to explain the source of momentum whereas all other variables might or might not have influence over momentum profits.

**Keywords:** momentum profits, business indicators, governance indicators, j6k6 momentum strategy.

**JEL Classification:** G15.

### Introduction

Short-term momentum effect can be explained as in short run recent past winners will remain winners and recent past losers will remain losers (Jegadeesh and Titman, 1993). In other words winners will outperform losers. The stocks that perform well in short run shall be declared as winners and stocks that perform worst in short run shall be tagged as losers. According to Emadzade, Hosseini, Shirazipour and Shokhmgar (2013) short-term momentum effect can last for 3 to 12 months whereas Griffin, Ji and Martin (2003) claim that it can last up to five years. Momentum investment effect has been turned into profitable investment trading strategy as investors take long positions in winners' portfolios and go short in losers' portfolios and thereby making profit.

However the origin of momentum investment strategy's profit is disputed (Zoghlami, 2013). If financial literature is studied on momentum, it becomes clear that different authors have tried to explain the origin of momentum from different aspects. For instance, Griffin, Ji and Martin (2003) tried to explain momentum profits through risk based models like CAPM, but they were not successful in fully explaining the source of profits of momentum strategy. Another group of authors emerged and tried to explain momentum effect through behavioral approach. For instance Daniel, Hirshleifer and Subrahmanyam (1998) and Barberis, Shleifer, and R. Vishny (1998) have tried to associate short-term momentum effect with behavioral biases. But Rubinstein (2000) criticized them by questioning the reliability of results. Some authors explained momentum through different variables. For instance Hong, Lee and Swaminathan (2003) explained the origin of momentum profits through different set of variables which they named as "information dissemination network". These

variables were judicial system efficiency, accounting standards quality, corporate disclosures, insider trading laws and corruption perception index. They were able to find a relationship between momentum profits and information dissemination network of countries but they were of the view that their study is not at all conclusive and their power of test is weak due to limited number of countries involved in the sample and limited data.

As the origin of momentum profits is not yet clear in the financial literature, therefore this paper seeks to find the origin of momentum profits using different set of variables. These variables fall under the category of "Business Indicators". Following are the variables "Starting a Business" (SB), "Getting Credit" (GC), "Enforcing Contracts" (EC) and "Closing a Business" (CB). The data on above variables has been taken from "Doing Business" report of World Bank. The purpose of the paper is to find the source of momentum profits. It seeks which variable or variables could better explain momentum profits. And any or all are statistically significant or not while explaining momentum profits. All above variables will be dependent variables and independent variable will be Momentum Profit "MP" which will be the average difference of returns of winners portfolios and losers portfolios i.e. W-L. All other variables shall be defined in the "Description of Variables" section. The rest of the paper includes description, literature review, methodology and analysis.

**Description of variables.** "Doing Business" report is prepared by World Bank. The objective of this report is to provide the information to the investors that which country is friendlier in conducting a business. It also provides information to the academics and journalists as well. They rank the countries after evaluating business indicators. Different business indicators have been used to assign ranking. Some of them are "Starting a Business", "Getting Credit", "Enforcing Contract", "Closing a Business" etc. They try to include as much economies as they can. "Doing Business" a project of World Bank prepares

a yearly report and publishes it. Since 2004, they have published 9 “Doing Business” reports that gave ranking to countries on basis of different business indicators. For instance for the years 2007, 2008, 2009, 2010, 2011 and 2012 the number of economies they have included are 175, 178, 181, 183, 183 and 183 respectively. Therefore, four business indicators have been chosen from “Doing Business” report to seek the source of momentum.

All variables have been described in accordance with the “Doing Business” report of World Bank.

“*Starting a Business*” calculates the cost of setting up a business. The scale of the business can be a small scale business to a large scale limited company. It also estimates the time as well as rules and procedure for setting up a new business in a country. “Doing Business” report adopted a standardized procedure to include businesses from across the globe. Some important things that should be considered for inclusion of a business in the DB report are 100% domestic ownership and startup capital should be 10 times of per capita income etc.

In “*Getting Credit*”, it measures to what extent laws regarding collateral and bankruptcy facilitate the debtors. It also measures that up to what extent creditors have information on the potential debtors who want to obtain loans.

The variable “*Enforcing Contract*” measures the effectiveness of judicial system regarding the dispute of commercial nature. It measures the time, cost and legalities of a dispute. All such things are measured when a case is filed and these things are kept on being measured till the decision of the case.

“*Closing a Business*” measures the limitations of rules, regulations and procedures regarding bankruptcy. It also highlights the problems in the process that halt the bankruptcy laws to implement for a long time.

## 1. Literature review

Hong, Lee and Swaminathan (2003) argued that the source of momentum profits is still a mystery and in their paper “Earnings Momentum in International Markets” they use a particular set of variables to seek the explanation of momentum. The set was given a name of “information dissemination network”. They wrote that short-term momentum effect is linked to the “institutional features” of a country and behavioral biases could not explain the attendance and nonattendance of momentum effect in different markets. Similarly country specific risk could explain the attendance and nonattendance in different economies (Rouwenhorst, 1999). Although the paper under review has two parts and other part deals with earning momentum strategy. However the review’s focus will be on the source of short

term momentum effect and its relation with the information dissemination network of a country.

The variables they have used for research were, accounting standards quality, corruption perception index, corporate information, insider trading laws, and judicial system efficiency. Their sample included 11 countries. The countries were Australia, Hong Kong, Japan, Korea, Malaysia, Singapore, Taiwan, Canada, France, Germany, and the United Kingdom. They use Datastream to collect share prices and market capitalization. Data for the variable corruption perception index was obtained from transparency international whereas for the variable insider trading laws they followed the approach of Beny (1999). By following the methodology of La Porta et al. (1998), they gathered the data on accounting standards and judicial efficiency. They found that level of investor’s protection shared inverse relationship with momentum effect. They argued that where investor’s protection is low, new information is not reflected in share prices because investors already know the information. They also found that countries experience fragile momentum effect where corruption is huge and they found that variable CPI was closely related to momentum returns. They argued that their results showed a strong connection between momentum effect and independent variables. They also wrote that momentum results would be insignificant when well informed players have unhindered trading concessions. While concluding they wrote that level of corruption and momentum effect shared a negative relationship and price and earnings momentum investment strategies are connected to information dissemination network of a country but they also wrote that their study is not ultimate by any angle due to weak power of test and limited sample and data. They threw a light on future research by highlighting that cultural difference between institutions among Asia and Europe could be an area to seek source of momentum returns.

Chui, Titman and Wei (2000) wrote a paper in which they inspected the relationship between momentum profits and legal systems, ownership structure and valuation volatility. They argued that short-term momentum effect is an established fact and their study is motivated by the two momentum research papers by Rouwenhorst (1998, 1999) who carried out research on 12 and 20 European and emerging stock markets respectively. They further argued that Rouwenhorst (1999) found that in emerging stock market momentum effect was not common but on average it resulted in profits. Therefore, they carried out research on 8 Asian stock markets and the countries were Hong Kong

Indonesia, Japan, Korea, Malaysia, Singapore, Thailand and Taiwan. They collected data before January 1975 till February 2000. Databases they used were NEEDS, PACAP and Datastream. Their data included all common shares. They found that momentum strategies were resulted in profits in all Asian stock markets except Japan. The division of common law and civil law became a good indicator to which country showed weak or strong momentum effect before financial crisis. The firms that have small capitalization, low market to book ratio and huge turnover ratio showed strong momentum effect and this finding was in line with US stock markets. They also found that group affiliate firms displayed weak momentum effect whereas independent firms showed strong momentum effect and foreign ownership of stocks effect the momentum phenomenon. Countries with common laws exhibited momentum whereas countries with civil law did not show momentum presence and this can be the area of future research, they wrote.

Chui, Titman and Wei (2010) wrote another paper on momentum in which they examine momentum and culture across different countries. Cultural differences across countries were measured by an individualism index prepared by Hofstede (2001). This index was related to overconfidence bias and self attribution bias. They argued that psychological literature showed that humans in individualistic countries have strong self attribution and over confidence than humans of collective countries and DHS (1998) also claimed that both biases can produce momentum returns therefore they tried to inspect that momentum effect and momentum profits were powerful in collective culture or individualistic culture. Hofstede developed individualism index between 1967 and 1973 on the employees of IBM in 72 countries and included 88000 respondents. They included 55 countries and used two databases which were CRSP and Datastream. They collected data from February 1980 to June 2003. They gathered data on stock prices and trading volume. They found that momentum profits, trading volume and volatility are positively related to individualism. They also found that momentum shared negative or inverse relationship with firm size and volatility but shared positive relationship with dispersion of analyst dispersion, transaction costs and knowhow of foreigners' to the market and relationship between momentum and individualism still survived even after the addition of above variables. Just like Hong, Lee and Swaminathan (2003) they also hinted on future research by saying that relationship between earning momentum strategies and individualistic culture have not been explored yet and may become the potential subject of research in near future.

## 2. Methodology

**2.1. Transformation of variables of countries' ranking into scale of "score".** In order to examine the relationship between momentum profits (MP) and business indicators, the variables that have been chosen are "Starting a Business" (SB), "Getting Credit" (GC), "Enforcing Contracts" (EC) and "Closing a Business" (CB). Data on above variables is obtained from "Doing Business" report prepared and issued by World Bank. "Doing Business" report has been prepared by World Bank since 2004. Data on above variables is obtained from the "Doing Business" reports of 2007, 2008 2009, 2010, 2011 and 2012 because earlier reports only provided the overall ranking of all variables for a particular country instead of providing the ranking of each variable for the same country. Following countries have been chosen for the purpose of examination of momentum profits' relationship with Business indicators: Argentina, Austria, Brazil, China, Chile, Greece, India, Italy, Ireland, Mexico, New Zealand, Pakistan, Turkey and the USA. There are total 14 countries in sample. For example for a country Argentina, the separate ranking of all variables have been obtained for the year 2007, similarly, the separate ranking of all variables have been obtained for the year 2008, 2009, 2010, 2011 and 2012. It means that for a country Argentina, a variable "SB" has six different rankings for the year 2007, 2008, 2009, 2010, 2011 and 2012 and same applies for other variables as well. Therefore, for all 13 countries, the respective rankings of all the variables shall be obtained for the year 2007, 2008, 2009, 2010, 2011 and 2012.

Countries with higher ranking of variables among 183 countries are not regarded as good economies. For instance, for a variable "Getting Credit", a country with the ranking of 144 indicates that obtaining a loan in that particular country is extremely difficult but if the ranking for the same variable of a particular country is 44, it indicates that advances can be obtained easily. A scale has been developed to transform ranking of a country for a particular variable into some score for the ease of analysis. A Scale of scores is constructed to give rankings a score. For instance ranking from 1 to 9 shall be given a score of 0.5. It means that if a country's ranking is falling in the ranking of 1 to 9 shall be given a score of 0.5. "0.5" is a score which indicates that economy of a country is good for a particular variable and vice versa. For instance, for a variable "Getting Credit", if a country has a ranking of 6 will be given a score of 0.5; it indicates that the economy of country gives good conditions to obtain advances. If a country scores 9, it indicates that economy of a country does not offer good conditions to obtain loans. Same scale is applicable for the other variables written above.

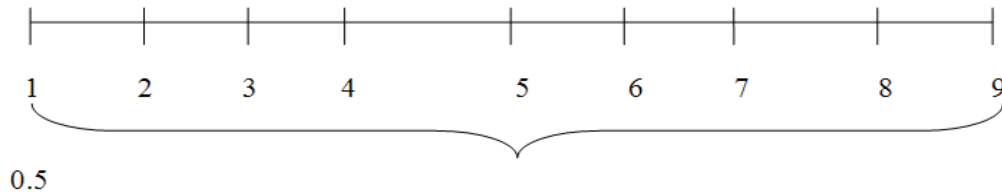
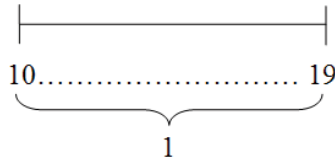


Fig. 1. Pictorial view of the “scale” and “score”

Numbers on the scale show the ranking of a country for particular variable and “0.5” appeared below the

parentheses is the score. Specimen for the rest of the scales and scores are as follows.



$$180 \geq 9.5$$

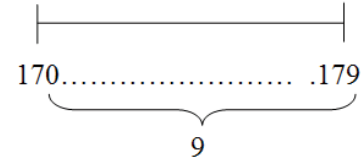


Fig. 2. Specimen for the rest of the “scales” and “scores”

Above scales show the rankings of countries and the scores assigned for each variable. Countries with the ranking of 180 and more shall be given 9.5 score. Lower the ranking, lower the score, and better the conditions of economy for a particular variable. Scores ranges from 0.5 to 9.5. “0.5” score shows good performance and 9.5 score shows the worst performance of a country for a particular variable.

**2.2. Construction of price momentum strategies.**

As the data of the variables above is yearly, so price momentum strategy shall be used which gives annual results. For instance, a j6k6 price momentum strategy can be constructed. A j6k6 momentum strategy is suitable to implement because the “scores” of the variables are yearly and a j6k6 strategy also gives annual returns because portfolios are formed on the basis of six months ( $j = 6$ ) and then they are held for another six months ( $k = 6$ ) to get the returns. Moreover j6k6 strategy has been used by many scholars whenever they wanted to investigate the momentum effect for large number of countries. For instance Chui, Titman and Wei (2003) used j6k6 momentum investment strategy when they analyzed eight Asian stock markets in their paper “Momentum, Legal Systems and Ownership Structure: An Analysis of Asian Stock Markets”. Again Chui, Titman and Wei (2010) adopted j6k6 momentum investment strategy for 55 countries when they examined relationship between momentum and individualism of societies. Hong, Lee and Swaminathan (2003) examined momentum in European markets and used j6k6 strategy for the stock markets of 12 countries. Similarly Griffin, Ji and Martin (2005) examined 40 countries for momentum effect and used j6k6 price momentum investment strategy. From the review of previous papers, it can be inferred that a j6k6 momentum strategy is useful when a sample has multiple countries.

To see the short-term momentum phenomenon and its relationship with business indicators, monthly data of stock prices of 14 countries for the period starting from 31<sup>st</sup> December, 2002 to 31<sup>st</sup> December, 2012 is downloaded from Data Stream. The stock prices are converted into returns because prices are not unit free but returns are. For return conversion following formula has been used

$$Returns = \frac{Price_t - Price_{t-1}}{Price_{t-1}} \times 100,$$

whereas  $Price_t$  is the closing price,  $Price_{t-1}$  is the opening price.

The methodology will be adopted which was used by Jegadeesh and Titman (1993). The main thing in methodology is to construct winners’ portfolios and losers’ portfolios. To construct winners and losers portfolios, all stocks listed on respective stock exchanges’ indices will be positioned according to deciles based on their previous “j”-month return at the end of each month. “j” stands for formation period and will be equal to 6 months. So, each month will give separate portfolios according to the time period of formation period. Top 10 performing stocks will be declared as winners’ portfolios and bottom 10 will be declared as losers’ portfolios. Then these portfolios will be held for k succeeding months. “k” is a holding period and equals to 6 months. So a j6k6 portfolio on July 1<sup>st</sup>, 2007 will show the performance of a portfolio from 31<sup>st</sup> December, 2006 to 30<sup>th</sup> of June, 2007 and will be held until 31<sup>st</sup> December, 2007. Each portfolio will be constructed like above. There are 84 j6k6 price momentum strategies constructed to get momentum profits “MP”. Momentum profits “MP” are obtained for every country for years 2007, 2008, 2009, 2010, 2011 and 2012. It means that for each country, 6

momentum strategies are run in order to have 6 yearly profits. For instance, for a country Argentina, the 1<sup>st</sup> momentum strategy is run for the year 2007, the 2<sup>nd</sup> momentum strategy is run for the year 2008, the 3<sup>rd</sup> momentum strategy is run for the year 2009, the 4<sup>th</sup> momentum strategy is run for the year 2010, the 5<sup>th</sup> momentum strategy is run for the year 2011 and the 6<sup>th</sup> momentum strategy is run for the year 2012 to get yearly momentum profits (MP) for years 2007, 2008, 2009, 2010, 2011 and 2012 respectively. Same methodology is applied to other 13 countries to get MP. Each momentum strategy is constructed on the basis of previous 5 years stock market data.

For instance a 2007 j6k6 momentum strategy is constructed on the basis of the stock market data for the time period of 31<sup>st</sup> December, 2002 to 31<sup>st</sup> December, 2007, similarly, a 2008 momentum strategy is constructed on the basis of the stock market data for the time period of 31<sup>st</sup> December 2003 to 31<sup>st</sup> December, 2008 and so on. It is done because a long time series is necessary to establish some statistical significance of the pervasiveness of the momentum effect and also only if one has a long time series then one can make sure that the effect is free from the sample selection bias. Following table has been produced after the methodology.

Table 1. Variables' score and momentum profits

	Year	SB	GC	PI	PT	EC	CB	MP	t stat of MP
Argentina	2007	5.5	2.5	5	8.5	3.5	3	14.74	28.78
	2008	6	2.5	5	7.5	2.5	3.5	13.92	38.97
	2009	7	3	5.5	7	2.5	4.5	14.83	50.91
	2010	7	3.5	5.5	7.5	2.5	4.5	13.87	61.14
	2011	7.5	3.5	5.5	7.5	2.5	4	14.04	48.53
	2012	7.5	3.5	6	7.5	2.5	4.5	13.15	38.37
Austria	2007	4	1.5	7.5	5.5	1	1	5.57	51.53
	2008	4.5	1.5	6.5	4.5	0.5	1.5	8.82	14.02
	2009	5.5	1	6.5	5	1	1.5	6.90	23.25
	2010	6.5	1	7	5.5	1	1.5	7.66	23.39
	2011	6.5	1	7	5.5	0.5	1.5	8.54	24.38
	2012	7	1.5	7	4.5	0.5	1.5	8.90	23.95
Brazil	2007	6	4.5	3.5	8	6.5	7	10.53	43.67
	2008	6.5	4.5	3.5	7	5.5	7	9.87	45.74
	2009	6.5	4.5	4	7.5	5.5	6.5	11.67	41.82
	2010	6.5	4.5	4	8	5.5	7	11.66	42.63
	2011	6.5	4.5	4	8	5	7	11.82	30.90
	2012	6.5	5	4	8	6	7	12.96	24.07
China	2007	6.5	5.5	4.5	8.5	3.5	4	15.81	13.21
	2008	7	4.5	4.5	8.5	1.5	3	18.44	23.43
	2009	8	3	4.5	7	1	3.5	19.67	30.87
	2010	8	3.5	5	7	1	3.5	19.09	28.24
	2011	8	3.5	5	6	1	3.5	17.07	35.71
	2012	8	3.5	5	6.5	1	4	15.09	42.71
Chile	2007	2	2	1	2	4	5.5	6.78	35.45
	2008	2	2.5	2	2	3.5	5	6.55	41.58
	2009	3	3.5	2	2.5	3.5	6	6.92	41.00
	2010	3.5	4	2.5	2.5	3.5	6	13.75	21.34
	2011	3.5	4	1.5	2.5	3.5	5	12.41	19.22
	2012	1.5	2.5	1.5	2.5	3.5	6	7.01	31.25
Greece	2007	7.5	4.5	8	5.5	2.5	2	11.21	55.08
	2008	8	4.5	8	4.5	4.5	2	9.01	14.51
	2009	7	5.5	8	3.5	4.5	2.5	11.78	50.50
	2010	6.5	1.5	2	8.5	9.5	7.5	11.46	47.78
	2011	7.5	4.5	8	4	4.5	2.5	11.82	45.75
	2012	7	4	8	4.5	5	3	13.37	34.67
India	2007	4.5	3.5	2	8	9	7	15.36	35.87
	2008	6	2	2	8.5	9	7	15.86	30.96
	2009	6.5	1.5	2	8.5	9.5	7.5	16.79	34.50
	2010	8.5	2	2.5	8.5	9.5	7	15.75	28.04
	2011	8.5	2	2.5	8.5	9.5	7	14.73	21.15
	2012	8.5	2.5	2.5	7.5	9.5	6.5	12.76	24.27

Table 1 (cont.). Variables' score and momentum profits

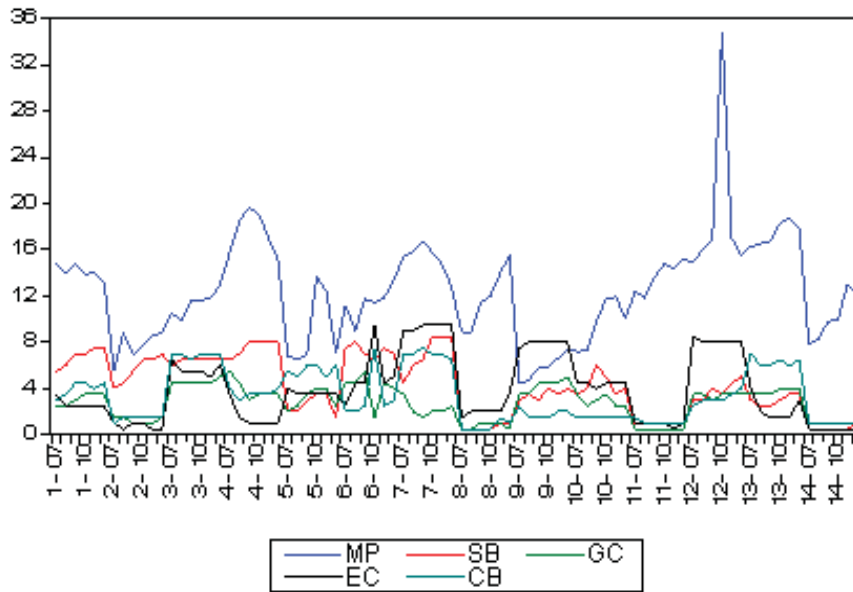
	Year	SB	GC	PI	PT	EC	CB	MP	t stat of MP
Ireland	2007	0.5	0.5	0.5	0.5	1.5	0.5	8.93	34.52
	2008	0.5	0.5	0.5	0.5	2	0.5	8.78	39.23
	2009	0.5	1	0.5	0.5	2	0.5	11.44	18.97
	2010	0.5	1	0.5	0.5	2	0.5	11.98	20.22
	2011	1	1	0.5	0.5	2	1.5	13.95	25.37
	2012	1	0.5	0.5	0.5	3.5	1	15.61	28.94
Italy	2007	3	3.5	4.5	6	7.5	2.5	4.45	41.99
	2008	3.5	3.5	3	6.5	8	1.5	4.73	44.46
	2009	3	4.5	3	6.5	8	1.5	5.79	28.30
	2010	4	4.5	3	7	8	1.5	5.93	28.72
	2011	3.5	4.5	3	6.5	8	2	6.59	36.12
	2012	4	5	3.5	7	8	2	7.43	38.44
Mexico	2007	3.5	3.5	2	6.5	4.5	1.5	7.19	29.67
	2008	4	2.5	2	7	4.5	1.5	7.29	29.91
	2009	6	3	2	7.5	4	1.5	9.92	22.79
	2010	5	3.5	2.5	5.5	4.5	1.5	11.72	25.69
	2011	3.5	2.5	2.5	5.5	4.5	1.5	11.95	22.38
	2012	4	2.5	2.5	5.5	4.5	1.5	10.05	23.51
New Zealand	2007	0.5	0.5	0.5	1	1	1.5	12.44	54.65
	2008	0.5	0.5	0.5	0.5	1	1	11.87	52.18
	2009	0.5	0.5	0.5	1	1	1	13.58	26.13
	2010	0.5	0.5	0.5	0.5	1	1	14.81	22.80
	2011	0.5	0.5	0.5	1.5	0.5	1	14.34	23.08
	2012	0.5	0.5	0.5	2	1	1	15.23	30.94
Pakistan	2007	3	3.5	1	7.5	8.5	2.5	14.90	39.48
	2008	3	3.5	1	7.5	8	3	16.05	27.54
	2009	4	3	1.5	6.5	8	3	16.90	28.82
	2010	3.5	3.5	1.5	7.5	8	3	34.86	9.69
	2011	4.5	3.5	1.5	7.5	8	3.5	17.00	25.07
	2012	5	3.5	1.5	8	8	4	15.51	34.98
Turkey	2007	3	3.5	3.5	3.5	4	7	16.28	42.62
	2008	2.5	3.5	3.5	3	2	6	16.54	46.87
	2009	2.5	3.5	3	3.5	1.5	6	16.71	53.45
	2010	3	4	3	4	1.5	6.5	18.29	28.05
	2011	3.5	4	3	4	1.5	6	18.70	30.62
	2012	3.5	4	3.5	4	3	6.5	17.86	25.47
USA	2007	0.5	0.5	0.5	3.5	0.5	1	7.82	52.52
	2008	0.5	0.5	0.5	4	0.5	1	8.26	47.86
	2009	0.5	0.5	0.5	2.5	0.5	1	9.83	22.79
	2010	0.5	0.5	0.5	3.5	0.5	1	9.88	21.89
	2011	0.5	0.5	0.5	3.5	0.5	1	13.05	17.57
	2012	1	0.5	0.5	4	0.5	1	11.99	14.92

The data turns out to be panel data therefore following model has been formed and run to test the relationship. But this model did not come in the following form directly. Different tests have been run and all statistical conditions have been fulfilled to get the model into following form which is fit to be used. The estimation and formation of the model is discussed in the next section.

$$\log MP_{it} = \alpha + \beta_1 \log SB_{it} + \beta_2 \log EC_{it} + \beta_3 \log GC_{it} + \beta_4 \log CB_{it} + \varepsilon_{it},$$

whereas  $i$  stands for country,  $t$  stands for time period,  $MP$  stands for momentum profits,  $SB$  stands for "Starting a Business",  $EC$  stands for "Enforcing Contracts",  $GC$  stands for "Getting Credit",  $CB$  stands for "Closing a Business".

**2.3. Model estimation.** First of all it needs to be examined that whether relationship between variables is linear or non linear. The linearity of the variables has been checked through a graph and it was found that all variables share non linear relationship.

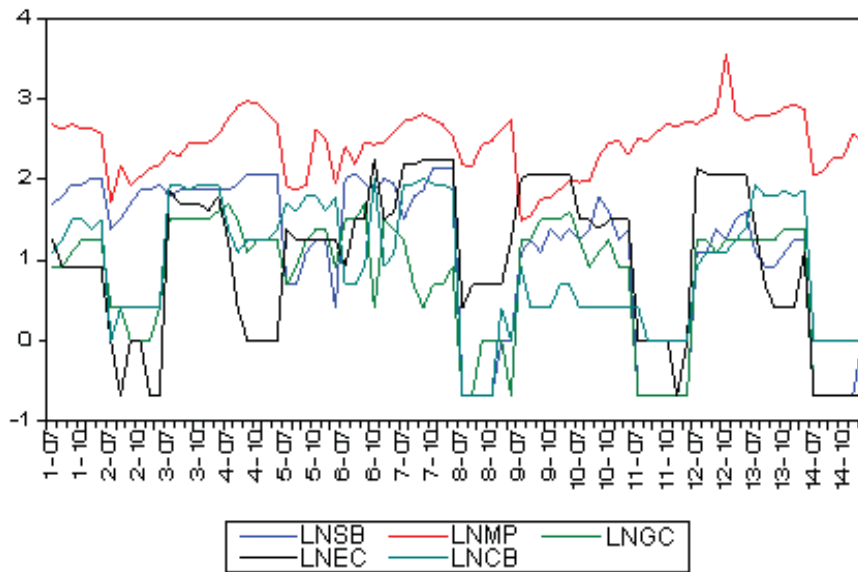


Source: Own calculations.

**Fig. 3. Non linear relationship between dependent and independent variables**

Horizontal axis has 14 countries for the time period of each country from 2007 to 2012 whereas vertical axis has the values. It can be seen that independent variable MP has started from 16, ended on 12 but achieved the highest peak at almost 34 whereas all other dependent

variables ranges mostly from 4 to 8. In order to run the regression the relationship should be linear. Therefore, log of all the variables have been taken and then linearity of the all variables has been examined through a graph as evident from the following figure.



Source: Own calculations.

**Fig. 4. Linear relationship between dependent and independent variables**

Similarly like previous graph,  $x$  axis has the 14 countries along with time period from 2007 to 2012 for each country.  $Y$  axis has the values. By looking at the graph, it is evident that variables now share linear relationship. The independent variable MP had the highest peak at 34 in the earlier graph but in this graph MP had started little below 3, ended also below 3 and attained the highest peak in between 3 and 4 whereas all other dependent variables mostly fall between 1 and 2. No variables touched the

negative values. This shows that after taking log, the variables share linear relationship and now regression can be run between independent and dependant variables.

Panel data can be defined as data which has more than one dimension and measured over time regularly and it includes manifold items and observations of similar individuals, so this data contains 14 countries, 5 variables including dependent



and independent variables and time period of 6 years for each country. Therefore, this data can be termed as panel data. It is evident that time series regression will not work on panel data. Therefore, multiple linear regressions will be run either for pool testing or panel testing. To decide whether regression should be run as pool data or panel data, following regression is run to examine the chow test. On the basis of Chow test it will be decided whether to run data for pool testing or panel testing. Therefore, following regression model is run in E views.

$$\log MP_{it} = \alpha + \beta_1 \log SB_{it} + \beta_2 \log EC_{it} + \beta_3 \log GC_{it} + \beta_4 \log CB_{it} + \varepsilon_{it}.$$

Table 2. Pool data regression result

Dependent variable: LNMP Method: Panel least squares Date: 04/10/13 Time: 21:11 Sample: 2007-2012 Periods included: 6 Cross-sections included: 14 Total panel (balanced) observations: 84				
Variable	Coefficient	Std. error	t-statistic	Prob.
C	2.341052	0.065912	35.51786	0.0000
LNSB	-0.025585	0.068218	-0.375054	0.7086
LNGC	-0.057523	0.093147	-0.617558	0.5386
LNEC	-0.062339	0.053642	-1.162139	0.2487
LNCB	0.261959	0.069893	3.747985	0.0003
R-squared	0.166936	Mean dependent var		2.454728
Adjusted R-squared	0.124756	S.D. dependent var		0.372415
S.E. of regression	0.348411	Akaike info criterion		0.786812
Sum squared resid	9.589839	Schwarz criterion		0.931503
Log likelihood	-28.04610	Hannan-Quinn criter.		0.844977
F-statistic	3.957663	Durbin-Watson stat		0.407210
Prob(F-statistic)	0.005588			

Source: Own calculations.

After running, above results are obtained and tested for Chow test to decide whether to go for pool data testing or panel data testing. Following are the results of Chow test.

Table 3. Chow test results

Redundant fixed effects tests Equation: Untitled Test cross-section fixed effects			
Effects test	Statistic	d.f.	Prob.
Cross-section F	19.653006	(13,66)	0.0000
Cross-section Chi-square	132.997943	13	0.0000

Source: Own calculations.

The results of the chow test are interesting. The value of F is 19.65 which is statistically significant and probability is very low which means that results are clearly denying the pool testing of data and suggesting that panel testing of the data under multiple linear regression should be carried out.

Under the panel testing, model needs to be examined for random effects and fixed effects before achieving the main results. Once the random effects validates that model is capable of running regression with fixed effects, only then results will be obtained and interpreted through multiple linear regression with fixed effects under panel testing. The model has been run for random effects and following output is obtained.

Table 4. Panel data random effects result

Dependent variable: LNMP Method: Panel EGLS (Cross-section random effects) Date: 04/11/13 Time: 13:51 Sample: 2007 2012 Periods included: 6 Cross-sections included: 14 Total panel (balanced) observations: 84 Swamy and Arora estimator of component variances				
Variable	Coefficient	Std. error	t-statistic	Prob.
C	2.225549	0.138665	16.04988	0.0000
LNSB	0.149370	0.088524	1.687341	0.0955
LNGC	0.055998	0.082501	0.678757	0.4993
LNEC	-0.101144	0.069238	-1.460810	0.1480
LNCB	0.126651	0.093060	1.360958	0.1774
Effects specification				
		S.D.	Rho	
Cross-section random			0.352264	0.8062
Idiosyncratic random			0.172712	0.1938
Weighted Statistics				
R-squared	0.121621	Mean dependent var.		0.481784
Adjusted R-squared	0.077146	S.D. dependent var.		0.184271
S.E. of regression	0.177020	Sum squared resid.		2.475556
F-statistic	2.734600	Durbin-Watson stat.		1.315671
Prob(F-statistic)	0.034607			
Unweighted Statistics				
R-squared	-0.057472	Mean dependent var.		2.454728
Sum squared resid	12.17312	Durbin-Watson stat.		0.267558

Source: Own calculations.

The above table will be tested for Hausman test. Basically Hausman test will validate that whether the model can be run with fixed effects or not. Following are the results of Hausman test.

Table 5. Hausman test results

Correlated random effects – Hausman Test Equation: Untitled Test cross-section random effects			
Test summary	Chi-sq. statistic	Chi-sq. d.f.	Prob.
Cross-section random	7.990364	4	0.0919

Source: Own calculations.

By looking at the results it is evident that this model can be run under multiple linear regressions with fixed effects. The value of Chi square is 8 which are significant at 9%. Now the model is fit to be run after fulfilling all statistical conditions. Now the regression function has been run and Table 1 has been produced for the analysis.

Table 6. Panel data fixed effects result

Dependent variable: LNMP				
Method: Panel least squares				
Date: 04/10/13 Time: 21:20				
Sample: 2007-2012				
Periods included: 6				
Cross-sections included: 14				
Total panel (balanced) observations: 84				
Variable	Coefficient	Std. error	t-statistic	Prob.
C	1.929968	0.167141	11.54695	0.0000
LNSB	0.304899	0.108171	2.818685	0.0064
LNGC	0.146688	0.097952	1.497548	0.1390
LNEC	-0.048002	0.084425	-0.568582	0.5716
LNCB	0.125559	0.111949	1.121570	0.2661
Effects specification				
Cross-section fixed (dummy variables)				
R-squared	0.828976	Mean dependent var	2.454728	
Adjusted R-squared	0.784925	S.D. dependent var	0.372415	
S.E. of regression	0.172712	Akaike info criterion	-0.486973	
Sum squared resid	1.968743	Schwarz criterion	0.033916	
Log likelihood	38.45287	Hannan-Quinn criter.	-0.277580	
F-statistic	18.81833	Durbin-Watson stat	1.714178	
Prob(F-statistic)	0.000000			

Source: Own calculations.

### 3. Analysis

In this part, first of all sources of momentum are to be discussed.

The results are the output of regression model mentioned in methodology section. It has been run as a regression of panel data testing under fixed effect. Through the results it will be examined that whether source of momentum profits have been found or not. In other words, from the results, it will be examined whether independent variables have successfully explained the dependent variable or not. As mentioned in the paper above that independent variables are SB ("Starting a Business"), GC ("Getting Credit"), EC ("Enforcing Contracts") and CB ("Closing a Business") whereas dependent variable is MP (momentum profits). Through the output of model, it not only confirms that whether these variables are behind the profits of momentum but it will also help in solving the riddle of source of momentum profits which stands still unresolved.

This model presents the overall view of the relationship. It sheds a general light on the relationship and tries to explain generally. It includes the data of 14 countries and contains all dependent and independent variables. But this data is limited in a sense that it is for only 6 years. However, the overall model is significant. The value of  $F$ -stat. is 18 which is significant even at 1% level of significance. The  $R^2$  and adjusted  $R^2$  have values of 82.89% and 78.49%, respectively. It is also known that  $R^2$  shows that to what extent independent variables explain the dependent variable. It can be

seen from the results that only variable which is significant is SB which has  $t$ -stat. value of 2.81 and is significant at 1% level of significance whereas other independent variables for instance GC, EC and CB are not significant. The results show that the independent variable SB has been able to explain the momentum profits and it shares a positive relationship with dependent variables MP. It means that countries that have easy conditions for setting up a business or countries that promote economic activity through starting a new business result in statistically significant momentum profits. This finding leads to an explanation that any country which is encouraging to set up new businesses or have relaxed conditions for starting new businesses is favorable for the implementation of momentum strategies in the stock market of that country. It also implies that independent variable SB can explain the profits of momentum and it also contributes to the source of momentum profits. The other independent variables GC, EC and CB have not been able to explain momentum profits successfully or partially because they are not statistically significant. It leads to an interpretation that factors like getting credit, enforcing contracts and closing a business do not directly influence the momentum profits to the larger extent. They might have influence over momentum profits but it can be very minimal. For instance, momentum profits are not influenced by a country's conditions in obtaining loans or advances to conduct businesses. It also implies that in a country where conditions for obtaining credit are easy or hard, it does not affect the profits of momentum in the stock market of that country. Similarly same expressions go for the other two variables according to the results. For instance, conditions of enforcement of business contracts and closing of businesses do not affect the momentum profits or momentum strategies if pursued in the stock market of the sample countries. In other words if countries put tougher conditions or lighter conditions, when it comes to enforcing businesses contracts and closing of businesses, it does not really impact the profits of momentum in either way. Similarly all three variables have not been able to explain the profits of momentum and do not contribute to the sources of momentum as they are not significant or they might have influence but this influence is negligible.

It can be interpreted safely that SB is relevant in explaining profits of momentum and SB and MP share direct relationship with each other which means that if setting up a business is easy in a country, than it is favorable to implement a momentum strategy in the stock market of that country. So it can be inferred from results that SB has explained the source of momentum profits to

some extent. Whereas other independent variables EC, GC and CB do not share any relationship with dependent variable i.e. MP, in other words, short-term momentum effect, momentum investment strategy and profits from momentum investment strategies are not influenced by country's conditions related to obtaining advances, implementation of business contracts and closing of business after bankruptcy. As value of  $R^2$  is 82.80%. It means that dependent variables have been able to explain independent variable up to 82.80% which is encouraging but it must be remembered that this regression is run under fixed effect which shows that there must be some other phenomena that could have explained the momentum effect which are still hidden and may explain the momentum effect fully. For instance, set of variable that fall under the category of "Governance Indicators" like voice and accountability or rule of law, control of corruption etc can be proxies to find the source of profits of momentum.

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## Conclusion

In the literature of finance, the origin of momentum effect is still a mystery. Many researchers have tried to find the source of momentum effect through risk based model or behavioral approach but results were not ultimate. Therefore in this paper, it has been tried to find the origin of momentum profits through a set of variables known as "Business Indicators". For the purpose of finding an origin, following countries have been chosen: Argentina, Austria, Brazil, China, Chile, Greece, India, Italy, Ireland, Mexico, New Zealand, Pakistan, Turkey and the USA. It is found that the variable "Starting a Business" is the only independent variable that could explain the origin of momentum investment strategies. All other variables might have influence over momentum profits but it was negligible. Future research in finding the origin of momentum profits can be done under new set of variables like "Governance Indicators".

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