ERASMUS UNIVERSITY ROTTERDAM

Erasmus School of Economics

Bachelor's Thesis in Finance [BSc in Economics and Business Economics]

Thesis title: Momentum Trading Strategies, Happiness and Cultural Tendencies

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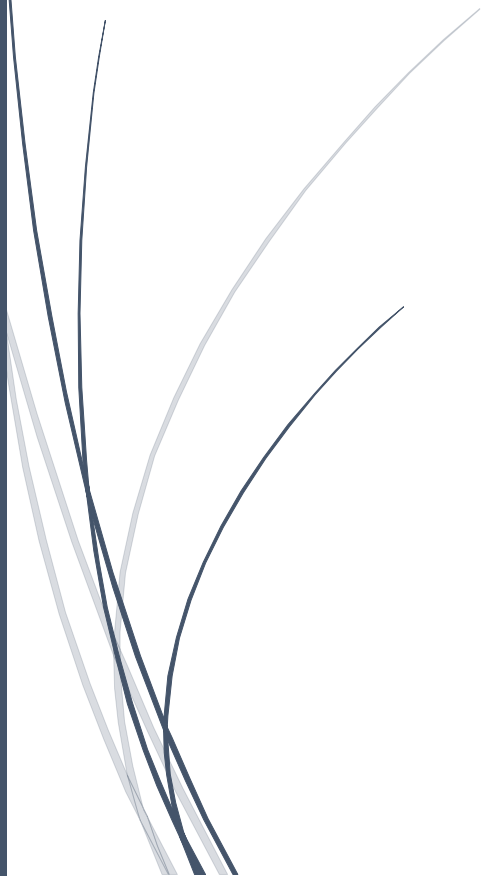
Date final version: 24/07/17



Abstract

The thesis investigates whether life contentment and cultural tendencies of various countries can globally explain the existence of price momentum phenomenon. It is found that higher life contentment leads to higher returns for the momentum trading strategies. It is argued in this research that higher life satisfaction causes people to prioritize less on financial-related matters and prioritize more on the 'upper' needs of the Maslow's hierarchy of needs, e.g. social or esteem needs. This, in turn, causes average investors to be less sensitive to financial information and thereby underreact, all else being equal. Furthermore, it was argued in the study of Chui, Wei and Titman (2010) that the individualistic tendency of a culture is related to 'overconfidence' and 'self-attribution bias' from the model of Daniel, Hirschleifer and Subrahmanyam (1998). These two biases should theoretically cause the existence of the price momentum phenomenon (Daniel et al., 1998). Nevertheless, unlike the results of Chui et al. (2010), the thesis is unable to find sufficient evidence for the Hofstede's (2001) individualism index to be positively associated with momentum returns. Instead, it is found that that Hofstede's (2001) masculinity index to be negatively associated with momentum returns, even after controlling for relevant variables. This signifies that the momentum phenomenon is less prominent in 'masculine' cultures. Further research may want to investigate the link between cultural masculinity and momentum effects.

Acknowledgement

I would like to acknowledge and show my great appreciation to Ms. Jing Zhao for her kind support and guidance throughout the process of writing this bachelor's thesis.

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1. Introduction

Price momentum phenomenon is one of the few anomalies with respect to the Efficient Market Hypothesis (EMH) that is still persistent in many countries; it has not been fully arbitraged away in recent times even after taking into account the barrier of transaction costs (e.g. Griffin, Ji & Martin 2003; Chui, Titman, & Wei, 2010). In brief, momentum phenomenon is a phenomenon where past winning (losing) stocks of the last three to nine months continue to overperform (underperform) in the next three to nine months, before following by a reversal (Jegadeesh & Titman, 1993). It is also found that the phenomenon is stronger in some countries than others (e.g Rouwenhorst, 1998; Griffin et al., 2003). A simple zero-cost strategy would be to long the winners and short the losers is shown to be profitable (Jegadeesh & Titman, 1993). It is surprising that irrationality in the stock market is not fully taken advantage of. An analogy is, there is an abundant of dollar bills conspicuously scattered across the sidewalk but nobody seems to be picking them up. One line of counterargument is that momentum effect is justified by some currently unknown risk factors. Alternatively, a supporting claim is arbitrageurs and professional investors are also exposed to psychological biases like everybody else. They may partly perpetuate the effect by their own investing behaviors.

From the behavioral theorists, Barberis, Shleifer and Vishny (1998) proposed an influential model of investor sentiment using insights from psychology. It shows how investors form and update their beliefs based on 'strength' and 'weight' of new information (Barberis et al., 1998). Depending on the relative 'strength' and 'weight' the investors perceive new information, this may cause underreaction in stock prices in some cases and overreaction in other cases. The predictions are consistent with momentum effect. On the other hand, Daniel, Hirschleifer and Subrahmanyam (1998) suggested an alternative model incorporating investor's psychological biases, namely 'overconfidence' and 'self-attribution bias'. These psychological components lead to the price momentum effect in the short-run but a reversal in prices in the long-run. Although the theories of both Barberis et al. and Daniel et al. lead to similar outcome, they are actually derived from different mechanisms. It is unclear which of the two models is more justifiable in real world settings. This thesis attempts to uncover this.

Momentum profits are found to be more prominent in Western developed economies than others (Griffin, Ji, and Martin, 2003). Conversely, emerging financial market as a whole does not exhibit momentum effect (Griffin et al., 2003). At first, this could mean the development of the financial infrastructure is a critical determinant in whether momentum profit is realized in a particular market. However, this is contrary to what one would expect since well-developed financial markets should be more efficient with respect to EMH. It is expected that well-developed financial markets should be composed of a higher ratio of institutional investors. Institutional investors are

presumably more rational and systematic in their investment approaches compared to individual investors. Thus, it is unclear why momentum effect is more prominent in developed financial markets, presumably dominated by these investors. Additionally, unlike Western countries, most Asian countries do not realize momentum returns regardless of how developed their financial markets are (Griffin, Ji, and Martin, 2003). This contradiction is rather puzzling. If one is subscribed to the rational asset pricing perspective, one might ask 'what is so risky with the West that investors are compensated with momentum return?'. Nevertheless, focusing on just the western hemisphere, most momentum returns appear to be concentrated in developed equity markets. In Asia, all developed financial markets including Singapore, Hong Kong, Japan and South Korea, do not realize momentum profits as seen in Griffin et al.'s literature. This is why it is suspected that price momentum phenomenon is related to cultural tendencies of the countries rather than associated risks.

This research investigates the association between life contentment variables and momentum trading profits. It is conjectured in this thesis that if people have higher overall happiness or life satisfaction, they should be less concern with financial-related matters. For this reason, using insights from Maslow (1943), satisfied societies are likely to prioritize on the 'upper' needs of Maslow's hierarchy of needs, e.g. social or esteem needs. This, in turn, should cause average investors to be less sensitive to new stock or financial signals and therefore are more prone to underreaction, all else being equal. Less sensitivity implies longer price adjustment duration. Using the momentum trading strategy, this would lead to high returns. This is one of the proposed mechanisms of the cross-country differences in the magnitude of momentum returns. Despite the fact that Asian countries like Singapore, Japan or South Korea are rank highly for economic affluence, they rank much poorer on the life satisfaction variables like World Happiness Report score the than their western counterparts (Helliwell, Layard, & Sachs, 2017). If the proposed conjecture is correct, this could be the reason why price momentum is not observed in these Asian countries.

In sum, the thesis argues that cultures may have an effect on these cognitive biases and thus may have led to the observed momentum returns of differing magnitude in different countries. It is interesting to observe the extent which the behavioral models of Barberis, Shleifer and Vishny (1998) and Daniel, Hirschleifer and Subrahnyam (1998) can reconcile with the aforementioned puzzles across nations. This should shed some light on the credibility of their models. In addition, this thesis should provide further indication whether risk or behavior factors is the main driver. Hence, the following research question will be investigated:

'Whether life contentment and cultural tendencies to overreact can explain the cross-sectional variation in momentum equity profits across various economies?'

In order to test the theories of Barberis et al. (1998) and Daniel et al. (1998), a new framework using human motivation theory is proposed that reunite theories consistently. By bridging the models of Barberis and Daniel to human motivation theory, this makes measurable variables needed to perform statistical tests obtainable. The human motivation theory is based on Maslow's hierarchy of needs (Maslow, 1943).

This thesis should contribute in a few ways to existing literature. Firstly, momentum returns of various countries are tested to see if they continue to exist in present days. Moreover, this is especially important for the Asian countries since past researches used older datasets which overlapped with the 1997-98 Asian Financial crisis. This may have introduced additional disturbing factors, leading to unfair estimates of momentum returns. Secondly, the explanatory power of cultures-related variables, which drive underreaction and overreaction, are investigated while controlling for other crucial factors. This would inherently test the behavioral models of Barberis et al. (1998) and Daniel et al. (1998). Importantly, the thesis will also check the robustness of the study done by Chui, Titman, and Wei (2010) who claimed that the cultural individualism can explain momentum returns variation across economies.

The original motivation of this thesis is to uncover the puzzle why momentum phenomenon is not prominent in Asian countries. Henceforth, an emphasis is placed on the Asian continent. In this research, 32 stock markets from the following countries/regions for the year 2000 to 2017 are included: Australia, Austria, Belgium, Brazil, Canada, Chile, China, France, Germany, Hong Kong, India, Indonesia, Italy, Japan, Luxembourg, Malaysia, Mexico, the Netherlands, Norway, the Philippines, Poland, Russia, Singapore, South Africa, South Korea, Switzerland, Taiwan, Thailand, UK, US, and Vietnam.

The outline of the paper is organized as following. Section 2 examines the existing literature with regard to price momentum effect as well as related theories from psychology. In section 3, the paper presents the data and methodology employed for the analysis. In section 4, the results of momentum returns and regression analyses are presented and discussed. Lastly, section 5 offers a conclusion and some suggestions for further research.

2. Literature Review

2.1 Price Momentum

2.1.1 Origins revisited and criticisms

Price momentum is a stock pricing anomaly with respect to the efficient market hypothesis (EMH). The phenomenon involves the best performing stocks (winners) and worst performing stocks (losers) of the last three to twelve months continuing to realize positive returns and negative returns, respectively, in the coming three to twelve months. This is then followed by a reversal in prices, constituting an overreaction. Using US data from 1965 to 1989, Jegadeesh and Titman (1993) were the first to demonstrate the exploitation of the anomaly by holding winner stocks and short-selling loser stocks was a profitable trading strategy. Their zero-cost portfolio appears to lead to an estimate of 1% return per month or about 13% per annum. This was an important discovery since it highly challenges the efficient market hypothesis (EMH) of the weak form proposed by Eugene Fama (1970). If the EMH of the weak form holds, historical prices are said to contain no information to predict future prices. Hence, consecutive price changes should follow a random walk process in the weak form and technical analysis should be of no use. In fact, prior to Jegadeesh and Titman (1993), Fama (1965) performed random walk tests on a number of US stocks, and he concluded that there is not much evidence for dependence of successive historical prices to future prices. The results of Jegadeesh and Titman (1993), therefore, challenge the robustness of Fama's (1965) random-walk models.

There were ample efforts invested to come up with an explanation for the momentum phenomenon, both from the rational asset pricing and behavioral theorists. For rational asset pricing view, it appears that the famous Fama and French (1996) three-factor model fails for the first time to explain the perpetuation of returns in the short-term as documented in Jegadeesh and Titman (1993). It is argued that one the plausible reasons could be due to data snooping, leading to spurious results. It will later see that this is actually not the case; price momentum is a worldwide phenomenon, not deriving from the particular dataset used by Jegadeesh and Titman. Nevertheless, Fama and French (1996) also acknowledged that the three-factor model may simply be unable to capture the risk associated with momentum effect.

2.1.2 Behavioral models and explanations

Many researchers have argued that price momentum phenomenon is due to investor irrationality instead of being risks-related. Most particularly, Barberis, Shleifer and Vishny (1998) proposed a model of investor sentiment, which appears to able to explain the phenomenon. The model is composed of two crucial components:

conservatism and representativeness heuristics. The driving psychological mechanism of conservatism is a phenomenon documented by psychologist Edwards. People are supposedly reluctant and sluggish to update their beliefs when they are presented with new evidences (Edwards, 1968, as cited in Barberis et al., 1998). Therefore, stock price momentum is reasoned to be due to investors' underreaction to information release. The second cognitive bias is 'heuristic representativeness' documented by Tversky and Kahneman (1974). Heuristics are used to help simplify complicated tasks that demand evaluating probabilities and outcomes (Tversy & Kahneman, 1974). Nevertheless, they can result in systematic errors. In heuristic representativeness, the agents view certain events as representative to a specific set of events while ignoring the fundamentals (Tversky & Kahneman, 1974). For instance, observing that a firm has consistent history of earnings growth, one may be tempted to extrapolate the growth into the future without considering probabilities and other valuation fundamentals. Griffin and Tversky (1992) attempted to reunite these two psychological biases by proposing a new framework. Agents update their beliefs according to the 'strength' (content) and 'weight' (credibility) of the new information (Griffin & Tversky, 1992). People tend to be biased towards the strength and tend to overlook the weight of evidence. Thus, when new information is truly of low strength but high weight, people do not react adequately, which is consistent with conservatism. This leads to an underreaction in prices. Conversely, if new information truly has high strength but low weight, people tend to overreact. This is in line with heuristic representativeness.

Nevertheless, the psychological framework Griffin and Tversky (1992) is silent on many aspects. For instance, it does not offer quantitative measures on the strength or the weight for the information. Therefore, the link to magnitude of the reaction is also unquantifiable. Motivated by their work, Barberis et al. (1998) offered a quantitative model showing how investors come up with these beliefs.

Another highly influential behavioral model was pioneered by Daniel, Hirschleifer and Subrahmanyam (1998). They demonstrated that the psychological biases, namely 'overconfidence' and 'biased self-attribution', can cause short-term price momentum effect and a reversal in prices the long-run. Overconfidence can stem from the investors' privately generated information and self-perceived abilities. These overconfident investors are more likely to ignore public information (Daniel et al., 1998). As a result, stock prices initially overreact to privately produced information but underreact public information when released. They show that overconfidence leads to negative autocorrelation (reversal) in the long-run as prices are corrected towards their fundamental valuations. Biased self-attribution occurs when newly released public information confirm investors' previously generated private information. The investors biasedly attribute the success to their own ability. This, in turn, leads to an increase in confidence. This could cause further trading, potentially perpetuating the overreaction. Inherently, this propels the price momentum effect. However, when public signals disconfirm their private information, they

are largely disregarded or seen as random bad luck (Daniel et al., 1998). Therefore, this does not lead to a decrease in confidence like it should have. Hence, biased self-attribution can asymmetrically lead to increase confidence in oneself. Overtime, the prices revert to their fundamental valuations, constituting long-term overreactions.

2.1.3 Rational asset pricing models

The Fama and French (1993) three-factor model fails to explain the price momentum phenomenon in terms of risk justification (Fama & French, 1996). This paved ways for behavioral explanations. Fama (1998) claimed that the behavioral models were designed to specifically match the anomalies, inherently leading to its own explanatory accomplishment. Behavioral models do not obviously unify with to other phenomena, while implying that the Fama and French (1993) three-factor model can.

Despite difficulty for the rational asset pricing theorists, an important risk-based model was proposed by Chordia and Shivakumar (2002). Using US data, it is shown in their paper that lagged macroeconomic variables associated with business cycle can explain and capture time-varying momentum returns. For the period of 1926 to 1994, they showed also that in contractionary periods momentum trading strategy on average leads to -0.72% monthly return ($t = -0.92$), whereas in expansionary periods, the strategy on average leads to a significant 0.53% monthly return ($t = 2.35$). A plausible reason they provided for the lack of significance in recessionary periods is the smaller time spans compared to economic expansions in the US, leading to lower power of the test (Chordia & Shivakumar, 2002). Nevertheless, the difference between these two is significant, suggesting that momentum payoff is tied to the business cycle and is a compensation for the risk. This is consistent with their conditional macroeconomic model.

2.1.4 Further international evidence and puzzle

At first glance, the work of Chordia and Shivakumar (2002) seem to have narrowed down the source of price momentum to simply related to business cycle risk. However, Griffin, Ji and Martin (2003) demonstrated that Chordia et al.'s conditional macroeconomic model is not robust for worldwide international datasets. Griffin et al. (2003) also found that momentum returns in international datasets are commonly positive in both contractionary and expansionary periods when using the sign of GDP growth as classifier. This challenges the results of Chordia and Shivakumar. Importantly, Griffin et al.'s (2003) findings of worldwide presence of price momentum using international data, including that of Europe, North America, South America, Africa, Oceania, and Asia, support an earlier done study of Rouwenhorst (1998). Rouwenhorst, using a sample of 12 European countries spanning from 1980 to 1995, was one of the first to find evidence for the price momentum outside of the US. In fact, the European results appear to be highly comparable to that of Jegadeesh and Titman (1993) in terms of magnitude (Rouwenhorst, 1998). The results of Griffin et al. (2003) are also similar.

While trying to expose the inconsistency internationally of the risk-based explanations of Chordia and Shivakumar (2002), Griffin, Ji and Martin (2003) also discovered that emerging market as a whole does not have significant momentum profit while developed market does. This is rather unexpected since well-developed financial markets are more likely to be dominated by institutional investors who are more systematic in their approach. Thus, with regard to the momentum effects phenomenon, it appears that the EMH of the weak form seems to hold more strongly in these emerging economies. Paradoxically, one would expect emerging economies to have less efficient financial markets. On the other hand, there is an exception. This pattern surprisingly does not hold true for Asian economies. Despites their highly developed financial markets, countries like Singapore, Hong Kong, South Korea and Japan nonetheless have low momentum profits just like other emerging Asian countries.

Moreover, Griffin et al. (2003) found that the correlations of momentum profits among countries of the same region and even across regions are quite weak, suggesting the source of risk is probably country specific. The thesis argues to differ that this may not entirely be the case. It does not necessarily need to be related to risk, but perhaps behavioral aspect unique to the country, which gives rise to dissimilar patterns of momentum profits when perceiving intra-regionally. Therefore, there may be underlying factors that could reconcile the clashing observed occurrences between Asia and the West. This is essentially the motivation of the thesis. The behavioral psychology of investors, which can be shaped by their cultures, social conditioning and economic environment, could play a role. For instance, South Africa appears to be an interesting case of outlier that has significant positive momentum payoff in the study by Griffin et al (2003) despite being an emerging economy. Though this is just a single case and could be due to random chance, but it is worth mentioning that South Africa is culturally closer to the West given its history and unique multi-ethnicity. According to Living Conditions Survey 2014/15, the average annual income of European descent South African is about five times higher than African descent South African (Statistics South Africa, 2017). It is probably plausible to assume that the financial markets are dominated by the statistically wealthier European descent investors. This case seems to suggest momentum effect to be behavioral. It questions why more westernized societies (as opposed to merely the European and North American continents) experience the price momentum phenomenon. Likewise, it is interesting to identify the cultural factors that cause Asian investors to invest differently compared to westernized investors.

2.1.5 Financial crisis and restoration of rationality

Although Griffin, Ji and Martin (2003) investigated the Southeast Asian nations, it is important to take note that countries like Thailand, the Philippines, Indonesia, Malaysia, Singapore and South Korea were hugely impacted by the 1997 Southeast Asian Financial Crisis. Particularly, the datasets of Griffin et al. (2003) for these countries for a

large part overlap in this turmoil period. It is currently not entirely clear if the momentum trading strategy works in a severe crisis.

Involving both the 1997 Asian crisis and the 1998 Russian crisis, Hwang and Salmon (2004) found that herding behavior is partly diminished during a crisis. The market shocks seem to have caused investors to re-evaluate and turn towards fundamental valuations rather than herd along with others (Hwang & Salmon, 2004). Even though price momentum and herding are separate phenomena, their study sheds some light on how investors act in times of crises. Since investor's irrationality seem to be partly corrected in a financial crisis, other irrationality responsible for the momentum phenomenon might also be rectified. If indeed momentum strategy performs poorly during recessions, regardless of risk-based or behavioral explanations, this could have an impact on the momentum payoffs in the paper of Griffin et al. (2003). Thus, it unfairly led lower momentum profits for these Asian countries. This thesis indirectly checks whether this still holds true with more recent datasets.

2.1.6 Dynamic model

Another innovative behavior model designed to explain momentum effects was constructed by Hong and Stein (1999). They offered a different perspective in explaining the phenomena of underreaction and overreaction, which presumably lead to the observed price momentum phenomenon. Instead of relying on investors' cognitive biases as drivers like in Barberis et al. (1998) or Daniel et al. (1998), Hong and Stein explored the dynamics in the interaction between two major forms of agents, naming them as "newswatcher" and "momentum traders". It is assumed that the two agents are not completely rational, they can take into account of only limited information (Hong and Stein, 1999). The interaction between the two agents is shown to generate the price momentum phenomenon in the short-term and a reversal in the long-term.

In Hong and Stein's (1999) model, the individual newswatcher can only observe private signals and make forecasts about future fundamentals. They cannot extract information from other newswatcher. In addition, their assumption is that newswatchers cannot condition their valuations based on past or current prices. On the other hand, momentum traders follow the trend of prices based on simple extrapolating strategy. However, their simple extrapolation based on past prices eventually lead to an overreaction. Another critical assumption that leads to underreaction is that private information diffuses only gradually diffuse among the newswatchers. For this reason, prices are not immediately and efficiently priced when information is released. In effect, this allows momentum traders to, on average, make a profit via simple extrapolating strategies.

The model seems explanatory despite being quite idealized in the sense that the market is composed only of two types of agents. Nonetheless, it is challenging how one could test the validity of model empirically. Furthermore,

the model does not appear to fully explain the more recent empirical results of Griffin, Ji, and Martin (2003). It is not obvious if the lack momentum returns in some countries imply full rationality of the two agents. Even if indeed the lack of momentum returns is due to full rationality, it still does not answer why investors in emerging economies or Asian investors are more rational. Regardless, this does not seem credible from the start.

Linking Hong et al. (1999) model to the observed high momentum returns of western countries, one may deduce that the interaction among the two types of agents are more prominent in western countries. There could be several plausible explanations based on their model. Firstly, one may posit that infrastructure to transmit information is more efficient in the East. However, this is unlikely to be the case since according to the Global Financial Centre Index (GFCI), even though five of the top fifteen financial centers are located in Asia, the rest is all Western nations (Z/YEN, 2017). Moreover, this still does not explain why emerging Asian economies, where by definition their infrastructures are not as developed and has less efficient information transmission, generally do not realize much momentum returns as seen in Griffin et al. (2003).

Alternatively, one may argue that the assumption that each newswatcher cannot extract other newswatchers' information holds less strongly for collectivistic Asian societies. It may be hypothesized that collectivistic cultures have tendencies to share and discuss information with each other before acting. Nevertheless, the issue with the sharing of information is it requires time (friction); only in an extreme case will this lead to no underreaction. To see why this is case, consider the following highly idealized situation. If everyone in the society does not act individualistically upon new information, but they first come together to discuss before acting collectively. This implies that there is a delay between information release and a sudden price adjustment. There should be no underreaction, only delayed reaction to information.

On the other hand, as a thought experiment, the thesis proposes an imaginary society composing of a minority of individualist who immediately acts upon new information while the majority of collectivists first come together to share and discuss information before acting as a group. Hence, when new information is released, there will first be an initial price movement closer to the new fundamental price imposed by the individualists. With a delay, this is followed by a sudden price adjustment by the collectivists. This still signifies that there is some underreaction. If this delay is lengthy, it implies that momentum traders can exploit the new trend with a simple strategy. Thus, it is still not clear why there should be no or less underreaction in Asian countries even when if the collectivists are the majority.

2.1.7 Herding and collectivism

It seems intuitive that high degree of collectivism should lead to herding-like behavior in the market. Herding implies that individuals mostly disregard private information. Instead, they copy others' strategies that are deemed as normalcy. This is contrary to Hong and Stein's (1999) assumption which states that newswatchers cannot extract information from other newswatcher but rely on their own private information. It may not be entirely clear what the consequence on price underreaction is when altering the assumption to match herding formation in their model. Nevertheless, at the empirical level, there seems to be contradictory findings for herding formation in the more collectivistic Chinese stock markets (e.g. Demirer & Kutan, 2006; Tan, Chiang, Mason, & Nelling, 2008). This is another reason why the model of Hong and Stein (1999) does not seem to be easily applicable to different contexts. More importantly, herding behavior is not easily observable empirically. Hence, the focus in this thesis will be largely based on psychological biases from the models of Barberis et al. (1998) and Daniel et al. (1998).

2.1.8 Delisted firms and bankruptcy

More recently, it is found the about 40% of momentum returns are derived from firms that went bankrupt during the holding period of the momentum strategy (Eisdorfer, 2007; Huyunh & Smith, 2017). Contrariwise, merged firms do not have much of an impact of momentum strategy profitability (Eisdorfer, 2007). Evidently, the momentum trading strategy involves longing the best performing stocks (top decile) and shorting the worse performing stocks (bottom decile) of the past 3 to 12 months (evaluation period) for the next coming 3 to 12 months (holding period). Naturally, firms that have experienced financial difficulties (bottom decile) in the past 3 to 12 months will have higher likelihoods of going bankrupt in the next 3 to 12 months during the holding period of the strategy. Using the momentum trading strategy, it is quite likely that struggling firms would be selected for short positions. With short positions on these firms, if they get bankrupt during the holding period, this would lead to abnormally large profits.

For this thesis, more interest is placed for the behavioral influences rather than the mechanics of the price momentum phenomenon. After all, the author is interested in how investors from different cultures act differently. It would deem unfair if in certain economies, firms are more likely to go bankrupt due to their infrastructures, legal institutions or economic climates. Therefore, bankruptcy would lead to overly high momentum profits. For this reason, only survived datasets would be used. This methodology should lead to more conservative estimates of momentum returns. Taking account of delisted firms, nevertheless, should not completely eliminate the existence of price momentum phenomenon as seen in Eisdorfer (2007). In addition, by

restricting the source of momentum returns, this should provide a fairer comparison of momentum profits among countries that are more stringently caused by psychological biases.

2.2 Bridging human motivation theory with price momentum

2.2.1 Maslow's hierarchy of needs

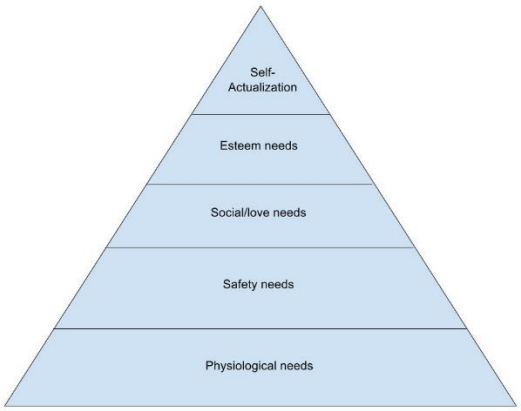

Figure 1: Maslow's (1943) hierarchy of needs

It is postulated that cultures can mandate how investors react in face of new evidence. Cultures where people are relatively more tranquil, satisfied and stress-free, are probably more likely to underreact in line with Barberis et al. (1998) when are presented with financial information compared societies with high pressure to perform. Human motivation for actions can be explored more closely through the Maslow's hierarchy of needs (Maslow, 1943) as seen in figure 1. According to Maslow's hierarchy of needs, when lower level of basic needs is satisfied, people move on to focus on 'higher' needs (Maslow, 1943). The first level includes physiological needs such as food, water, sleep, etc. Once this level of needs is satisfied, the individual can move on to focus on the next needs such as safety and social belongings. If one lacks food or lives in a constant fear of being robbed, one is unlikely to be very happy. As one climbs up Maslow's hierarchy of needs, one is more likely to be satisfied with life. Finance can have strong impact on the first two hierarchal levels of Maslow; money can directly purchase materials to satisfy these needs. The third level of needs is 'social needs', where money becomes less influentially important. Once the first two levels are satisfied, there should be immediate threat in life. This should lead to higher tranquility, less stress and anxiety. Therefore, all else being equal, these people should be less concern to financial information that affect their well-being than those that have not satisfied the first two levels. For this reason, this

could be why price momentum effect is more commonly observed in well-developed economies, since people are less sensitive to financial-related signals.

2.2.2 Empirical evidence and linking to behavioral models

The study of Kahneman and Deaton (2010) confirms the link between money and happiness. They found evidence in the US that emotional well-being does not increase beyond an annual income of $75,000. In their paper, emotional well-being is the day-to-day happiness which include hedonistic measures of 'stress-free', 'positive affect' (term in their paper for enjoyment and smiling), and 'No blue' (term for lack of sadness and worrying); income have beneficial effects for these measures up until $75,000 (Kahneman & Deaton, 2010). Since people become less reliance on their finances for their happiness once they reach to a certain point of wealth accumulation and income, they are more likely to prioritize other areas of life that do not strictly require finances such as friendships, leisure, arts, creativity, etc. The opportunity costs, e.g. as forgone social bonding, spirituality pursuits, arts, etc., are higher to be fully attentive to investment information. For this reason, stocks investment and further wealth creation, which are for a large part related to survival and security in the first two levels of Maslow's hierarchies of needs, should theoretically become secondary once satisfied. And since financial-related matters are no longer priority in life, investors in well-developed economies may be more sluggish to react to new stock information and less inclined to update their beliefs. Hence, it is hypothesized that higher income lead to stronger underreaction in the model of Barberis et al. (1998). Higher income nations should somewhat be relatively happier than developing nations, ceteris paribus.

Although income might explain why price momentum phenomenon is largely prominent in well-developed financial markets through Maslow's hierarchy of needs, it fails to explain the second puzzle that Asian nations generally do not realize momentum returns regardless of the degree of financial market development. Therefore, there is possibly another crucial factor at play. As pointed out in Daniel, Hirschleifer and Subrahmanyan (1998), overconfidence and self-attribution bias may also give rise to momentum effect. More collectivistic societies, such as Asian countries, may by definition have inferior self-confidence to stand up for individualistic pursuits in fear of cultural disapproval.

2.2.4 Self-esteem

The psychological biases of 'overconfidence' and 'self-attribution', as documented in Daniel et al. (1998), can be regarded as related to the fourth level of Maslow's hierarchy of needs in figure 1. The fourth level of the hierarchy involves 'esteem needs', which is the needs for recognition and acceptance from others (Maslow, 1943). In everyday's work setting, for example, one may be motivated to work hard to get approval and respect from one's seniors and peers. National cultures may determine relative ease in getting accepted and recognized; different

cultures have different power distances to their authoritative figures. Consequently, management leadership style can be seen as a manifestation of national culture. According to the Geert Hofstede's Power Distance Index, which measures the degree of paternalism of the boss and its desirability from the perception of the subordinates, it is evident that many of the Asian countries, especially the Southeast Asian nations, are on the upper end of the spectrum in terms of power gaps while Western nations are in the lower end (Hofstede, 1983).

It is not clear whether autocratic management style, prominently in high power distance culture (e.g. Asia), reduces the employee the chance of being recognized and validated. Nonetheless, the lower emotional-distance management style – transformational leadership – is by definition more inspirational to followers towards the company's vision, since it believes in the followers' abilities to accomplish goals (Bass, 1985). Transformational leadership style is deduced to be less prominent in Asia, because of its lower power distance in the society as seen in Hofstede (1983). It has been argued that this type of management style may directly help increase employee's confidence by fulfilling Maslow's hierarchy of recognition and even self-actualization (Burns, 1978, as cited in Bass, 1985). Indeed, studies have shown transformational leadership leads to higher job satisfaction than the more autocratic transactional leadership that uses rewards and punishments (Emery, & Barker, 2007; Nguni, Sleegers, & Denessen, 2006). Consistent with the Maslow's hierarchy of needs, a study has shown that self-esteem of an individual has a correlation of 0.47 with life satisfaction (Diener, E., Diener, M., 1995). Therefore, life satisfaction variables may be seen as somewhat related to cultural confidence.

Following the above reasoning, it can be argued that Asian investors are less likely to be fulfilled with the fourth level of Maslow's hierarchy of needs. This could perhaps explain the second puzzle why price momentum phenomenon is not generally observed in Asia. Asian investors may tend to be less confident in their own privately generated information and more likely to acknowledge public information contrary to the model of Daniel et al. (1998).

Self-attribution bias proposed by Daniel et al. (1998), can be regarded as a tool used by individuals to fulfill their esteem needs in times of good news by attributing the lucky chance to their abilities. Nevertheless, in times of bad news, it helps preserve self-esteem when information conflict with the investors' own views. In other words, it can be seen that when reality negatively clashes with the investor's conception of actuality, instead of letting it undermines the fourth level of Maslow's hierarchy of needs, 'self-attribution bias' helps protect the self-esteem by identifying the occurrence as unlucky chance. Thereby, it prevents the individuals from feeling bad about themselves.

It appears that confidence and sense of self-worth can be nurtured through culture, just like leadership style is a manifestation of national culture. Moreover, it is intuitive that self-esteem should have spillover effects to other areas of one's life. Hence, in countries where workers on average have more confident in their abilities, e.g. at the workplace, all else equal, the mostly likely have more self-esteem in their investment abilities too. Incorporating the theory of Daniel et al. (1998), countries where investors have higher self-esteem and sense of self-worth, are likely more prone to become overconfident in their own privately generated information and therefore underreact to public information. Through the self-attribution mechanism and confirmation bias, public information which confirm the investors' prior privately gathered information prompts an ongoing overreaction, generating short-term momentum in stock prices while conflicting public signals are largely ignored (Daniel et al., 1998).

Thus far, it has been argued that an individual is more likely to underreact to financial information and eventually undergoes overconfidence and self-attribution bias as the individual successfully climbs up the Maslow's hierarchy of needs. This framework attempts to reconcile both the model of Barberis et al. (1998) and model of Daniel et al. (1998) together via Maslow's Hierarchy of Needs. Hence, variables related to life contentment are deduced to be explanatory for the price momentum phenomenon.

2.2.4 Individualism and momentum effect

This thesis is immensely inspired by the work of Chui, Titman and Wei (2010). Chui et al. (2010) were one of the firsts to attempt to find appropriate proxy to empirically test the overconfidence and biased self-attribution model of Daniel et al. (1998) on the price momentum phenomenon. Using the insights from the literature of Markus and Kitayama (1991) in psychology where it is explored that Western cultures stress on the importance of appreciating one's difference, i.e. regarding oneself as an autonomous entity, while Asian cultures emphasize on viewing oneself with less discrepancy from others in order to achieve harmonious interdependence, Chui et al.(2010) made the connection that individuals in individualistic cultures are more likely to think highly about themselves and their own abilities, leading to higher likelihood of 'overconfidence' and 'self-attribution bias'. Chui et al. (2010) provided a convincing argument linking self-attribution as related to Hofstede's individualism index in their paper to proxy for overreaction and self-attribution bias. Hofstede's individualism index reveals the extent a person views his or her own internal attributes as unique relative to others (Hofstede, 2001, as cited in Chui et al., 2010). Importantly, Chui et al. found that the individualism index is positively associated with the magnitude of momentum strategy profits observed in various countries, even after controlling for transactions costs. This is an important finding, because transaction cost can be seen as a barrier that prevents arbitrageurs from taking full advantage of the price momentum anomaly. Therefore, it is inferred that arbitrageurs and professional investors

themselves are also influenced by their own cultures, and this can psychologically cause them to behave irrationally with regard to rational asset pricing.

Enthused by the research of Chui et al. (2010), thus the thesis further explores the robustness of their work. Chui et al. (2010) included delisted firms in their datasets. If the firms become delisted, they rebalanced the portfolio at the end of the particular month. As mentioned in section 2.1.8, it has recently been shown that momentum returns are significantly driven by bankrupted delisted firms. This thesis instead uses survived datasets to isolate external factors that cause these bankruptcies to ensure fair comparisons on the basis of psychological bias driven momentum returns. After all, the author is interested in how cultures amplify psychological biases of investors, not the technicality of their infrastructure.

However, the thesis argues that Chui et al. (2010) did not cover all essential factors regarding price momentum phenomenon. For instance, their work still fail to explain the first puzzle why price momentum phenomenon is prominent in well-developed financial markets but not in emerging markets. Chui et al. (2010) seems to have largely disregarded underreaction to information, a component crucial to Barberis et al. (1998) model. Secondly, the Hofstede's Individualism index which Chui et al. (2010) used is a static index. It does not portray how the change in the index lead to variation in momentum payoffs. This lowered the power of the test. Moreover, the index was reported in 2001. However, many of the datasets used in Chui et al. (2010) range from the year 1981 to 2003. In this roughly twenty years span, a lot had changed both economically and geopolitically. For instance, the fall of the Berlin Wall in 1989, the Japanese asset price bubble in the late 80s, the return of sovereignty over Hong Kong to PRC in 1997, the September 11 terrorist attacks in 2001, etc. Certainly, these changes have impacted people's well-being and life attitude either positively or negatively. It is not clear if a set of static data points in 2001 could representatively capture these changes. Therefore, the Hofstede's Individualism Index may lead to biased estimates. An enhanced method is to obtain a dynamic proxy for overconfidence and self-attribution bias that varies over time. The thesis circumvents this problem by using Maslow's hierarchy of needs framework to give a more dynamic picture of the development in life satisfaction. This, in turn, proxies for the level of aggression investors update their beliefs as well as accounting their overall level of confidence.

2.2.5 Happiness and life contentment

To sum it all up, finance can have a large impact on the first two level of Maslow's hierarchy of needs. It has been argued that this leads to a tendency for underreaction to financial information similar to the model of Barberis et al. (1998) in economies with higher incomes. On the other hand, it has also been argued that cultures with more collectivistic tendencies are less likely to fulfill 'esteem needs' or the fourth level of Maslow's hierarchy of needs. Individualistic cultures, on the other hand, rely less on others for validation; they fulfill their self-esteem through

their own unique actions. For this reason, individualists are also more prone to be overconfident, which in turn perpetuate the momentum effects presumably consistent with the model of Daniel et al. (1998).

Now, it can be seen that both finance and individualistic tendencies can give leverage for individuals to climb up the Maslow's hierarchy of needs. Therefore, possessing these two characteristics offer higher chance of being fulfilled with life. By satisfying the hierarchy of needs, the individual can increase life satisfaction or happiness (Maslow, 1943). Since life contentment reconciles both the model of Barberis et al. (1998) and Daniel et al. (1998), they can used as an explanatory proxy for price momentum phenomenon across the globe.

Human development index (HDI) provides a respectable composite and yearly measure for the standard of living. It is published under the United Nations Development Programme. It composes of three main components: health (life expectancy), education and income. Although two countries might have the same GDP per capita, but if the life expectancy and level of education of one is much lower than the other, this signifies a lower potential to achieve life fulfillment. Thus, these components are crucial to satisfy the Maslow's hierarchy of needs. Moreover, HDI database is readily available for various countries and years, making it an ideal choice to proxy for life contentment.

HDI is undeniably more paternalistic in its measurement approach. It says what people ought to value in life, i.e. health, education and income. However, people may not feel the same way. For instance, seemingly successful and well-educated investors in a highly developed country can also be struggling with the first two level of Maslow's hierarchy of needs. For example, investors may struggle with debt obligations, drugs, gambling addiction or mortgage payment. This would cause these investors to prioritize these finances (e.g. stock news) over other needs. Hence, HDI measures neglect this. Utilizing revealed preference approach, if people convey their level of happiness through life choices, then one can directly observed these choices. If life is unbearably in a particular country, one can expect higher suicide rates. This signifies that less of Maslow's hierarchy of needs are being met. The inverse of suicide rate therefore implies higher life satisfaction. Statistics for suicide rates for various countries are more easily obtainable compared to depression rate for instance. Nevertheless, they are not as yearly available as HDI. A short-coming for this measurement is that cultural and religious perceptions on suicide can play a role. A highly religious country despite being unhappy, may have low suicide rate due to the morality associated with it.

Happiness survey can avoid some of the aforementioned problems. The World Happiness Report is prepared by Helliwell, Layard and Sachs (2017) for the Sustainable Development Solutions Network, which was commissioned by the United Nations. The World Happiness Report evaluates the Cantril's Self-Anchoring Scale for over 150

countries (Helliwell, Layard, & Sachs, 2017). The Cantril's ladder scale, the version implemented by the Gallup World Poll, measures subjective well-being by asking the subject the following question "Please imagine a ladder, with steps numbered from 0 at the bottom to 10 at the top. The top of the ladder represents the best possible life for you and the bottom of the ladder represents the worst possible life for you. On which step of the ladder would you say you personally feel you stand at this time?" (Cantril, 1965; Helliwell, Layard, & Sachs, 2017). The World Happiness Report obtained the data for the Cantril ladder from Gallup, Inc. Data from year 2005 for a number of countries are available; this makes it a viable proxy for well-being or life fulfillment.

According to the World Happiness 2017 Report, it appears that not every high income country actually realizes high happiness score (Helliwell et al., 2017). This results seem to agree with Maslow (1943) since high income is not a necessary condition to satisfy 'upper' levels of needs, rather income is only necessary (and sufficient) to satisfy the first two levels. For instance, according to the World Happiness Report 2017 data, Singapore ranks number three in terms of GDP per capita, but it happiness score only ranks at 26. Similarly Japan only ranks at number 51 while South Korea ranks at 56 for happiness. Western nations overall rank more highly. Another survey-based measure is the Satisfaction with Life Index compiled in 2006 for the Happy Planet report (Marks, Abdallah, Simms, & Thompson, 2006). Of all 178 countries available in the raking, Asian markets surprisingly come relatively low on the ranking. For instance, Singapore ranks at 53, Hong Kong at 65, Japan ranks at number 90, and South Korea at 102.

A study, among others, has shown that income inequality in the US is linked to unhappiness (Oishi, Kesebir, & Diener, 2011). In fact, they also show for lower income-households, the arisen unhappiness is not due to low incomes, but the alleged unfairness and mistrust. Since income inequality can have an effect on subjective well-being of people, it important to control for this when utilizing income measures to proxy for well-being. The thesis would also inherently test income inequality's effect on price momentum.

2.3 Hypotheses

Bridging price momentum models with human motivation theories thus lead to the following hypotheses for testing:

Hypothesis 1: *Life satisfaction (well-being) variables can positively explain momentum returns across countries*

Hypothesis 2: *Increase in national income lead to higher momentum returns*

Hypothesis 3: *Higher Individualistic (power distance) indices may lead to higher (lower) momentum returns*

3. Data and Methodology

3.1 Momentum returns

3.1.1 Datasets

The list of countries and stock exchanges that are tested in this thesis can be seen in table 1. Stock returns data are all obtained from Thomson Reuters Datastream. Only active firms are included; the rationale for this can be found in section 2.1.8. There are altogether 31 countries/regions used in this thesis. The countries are selected based on their size and number of stocks. Small stock exchanges may render momentum trading strategy unfeasible. Employing the data cleaning methodology of Chui and Titman (2010), monthly stock returns that are greater than 100% are set to be 100%, and those below -95% are set to -95%. This should help prevent extreme outliers that are mostly likely due to Datastream's input error.[1] Furthermore, one would want to investigate momentum strategy on the relative strength of the stock and not simply due to its lack of liquidity, as reasoned in Chui and Titman (2010). Refer to section 4.1 of the results for the summary statistics for the calculated dependent variable – momentum returns. In addition, further breakdown of the summary statistics for the zero-cost 'winner minus loser' (WML) portfolio for each country can be found in appendix A.

Summary Statistics – Datasets and Cultural Index

Country/Region	Stock Exchange	Data Time Period	Mean HDI	Individualism Index
Australia	Australian Securities Exchange	01/01/2000 – 28/02/2017	0.92	90
Austria	Vienna Stock Exchange	01/01/2000 – 28/02/2017	0.87	55
Belgium	Euronext Brussels	01/01/2000 – 28/02/2017	0.88	75
Brazil	BM&F Bovespa	01/01/2000 – 28/02/2017	0.72	38
Canada	Toronto Stock Exchange (TSX)	01/01/2000 – 28/02/2017	0.90	80
Chile	Santiago Stock Exchange	01/01/2000 – 28/02/2017	0.81	23
China	Shanghai Stock Exchange	01/01/2000 – 28/02/2017	0.68	20
France	Euronext Paris	01/01/2000 – 28/02/2017	0.88	71
Germany	Frankfurt Stock Exchange	01/01/2000 – 28/02/2017	0.90	67
Hong Kong	Stock Exchange of Hong Kong	01/01/2000 – 28/02/2017	0.88	25
India	National Stock Exchange of India	01/01/2000 – 28/02/2017	0.56	48
Indonesia	Indonesia Stock Exchange	01/01/2000 – 28/02/2017	0.65	14
Italy	Borsa Italiana	01/01/2000 – 28/02/2017	0.86	76
Japan	Tokyo Stock Exchange	01/01/2000 – 28/02/2017	0.88	46
Luxembourg	Luxembourg Stock Exchange	01/01/2000 – 28/02/2017	0.88	60

[1] For instance, returns of over 5,000% in a month are not uncommon in Datastream for some emerging markets; this is most probably due to database errors

Malaysia	Bursa Malaysia	01/01/2000 – 28/02/2017	0.76	26
Mexico	Mexican Stock Exchange	01/01/2000 – 28/02/2017	0.73	30
The Netherlands	Euronext Amsterdam	01/01/2000 – 28/02/2017	0.90	80
Norway	The Oslo Stock Exchange	01/01/2000 – 28/02/2017	0.93	69
The Philippines	Philippine Stock Exchange	01/01/2000 – 28/02/2017	0.66	32
Poland	Warsaw Stock Exchange	01/01/2000 – 28/02/2017	0.82	60
Russia	Russian Trading System	01/01/2000 – 28/02/2017	0.77	39
Singapore	Singapore Exchange	01/01/2000 – 28/02/2017	0.88	20
South Africa	Johannesburg Stock Exchange	01/01/2000 – 28/02/2017	0.63	65
South Korea	Korea Stock Exchange	01/01/2000 – 28/02/2017	0.87	18
Switzerland	SIX Swiss Exchange	01/01/2000 – 28/02/2017	0.92	68
Taiwan[2]	Taiwan Stock Exchange	01/01/2000 – 28/02/2017	NA	17
Thailand	Stock Exchange of Thailand	01/01/2000 – 28/02/2017	0.70	20
UK	London Stock Exchange	01/01/2000 – 28/02/2017	0.89	89
US	NYSE/NASDAQ	01/01/2000 – 28/02/2017	0.90	91
Vietnam	Ho Chi Minh City Stock Exchange	01/01/2006 – 28/02/2017	0.64	20

Table 1: Datasets summary

Table 1 shows the Hofstede individualism index as well as the time series mean HDI. The individualism index is used to proxy for overconfidence in the subsequent section for the regression analysis. HDI is used to proxy for well-being, as discussed in section 2.2.5. It appears Asian cultures tend to overall score lower on the individualism index. On the other hand, westernized cultures tend to score much more highly on the individualism index. This was the motivation behind Chui et al. (2010) who believed that this would explain the puzzle for the inexistence of momentum returns in Asian nations. Nevertheless, for the well-developed Asian financial markets like Singapore, Hong Kong or Japan, it can be seen that the HDI appear to be on par to the Western counterparts.

Summary statistics - Cantril Ladder

Country	Mean	Std. Dev	Min	Max
Australia	7.314	0.077	7.196	7.450
Austria	7.228	0.198	6.950	7.499
Belgium	7.031	0.150	6.854	7.262
Brazil	6.748	0.274	6.321	7.140
Canada	7.447	0.115	7.245	7.650
Chile	6.409	0.382	5.698	6.844
China	4.961	0.307	4.454	5.325
France	6.667	0.270	6.283	7.093
Germany	6.737	0.202	6.417	7.037
Hong Kong	5.450	0.144	5.137	5.643

[2] The World Bank has no available Human Development Index for Taiwan; Taiwan is not identified as an autonomous state by the UN

India	4.705	0.374	4.179	5.348
Indonesia	5.218	0.241	4.815	5.597
Italy	6.239	0.365	5.839	6.854
Japan	6.047	0.207	5.845	6.516
Luxembourg	6.976	0.140	6.702	7.131
Malaysia	5.878	0.281	5.385	6.322
Mexico	6.828	0.342	6.236	7.443
Norway	7.562	0.106	7.416	7.678
Poland	5.832	0.170	5.587	6.162
Russia	5.526	0.345	4.964	6.037
Singapore	6.542	0.297	6.033	7.062
South Africa	4.883	0.458	3.661	5.346
South Korea	5.883	0.430	5.332	6.947
Switzerland	7.550	0.118	7.459	7.776
Taiwan	6.230	0.283	5.548	6.513
Thailand	6.132	0.439	5.476	6.985
The Netherlands	7.468	0.099	7.321	7.631
The Philippines	5.038	0.295	4.589	5.547
UK	6.861	0.141	6.515	7.029
US	7.137	0.194	6.804	7.513
Vietnam	5.304	0.235	5.023	5.767

Table 2: Descriptive statistics – Cantril Ladder for the year 2005 to 2016

From table 2, it is clear that developing economies seem to overall have higher standard deviation for their subjective-wellbeing over the years. This is expected since high economic growth (and volatility) should intuitively lead to high fluctuation for life satisfaction's perception. Asian countries appear to score lower for their subjective-wellbeing. For the financially advanced Asian economies, Hong Kong scores a mean of 5.450, Japan scores 6.047, South Korea scores 5.883, and Singapore scores at 6.542. These seem to overall be lower than the developed Western counterparts, e.g. Canada, France, Germany, the Netherlands, UK, US, etc. Surprisingly, despite being developing economies, Latin American countries like Mexico, Chile or Brazil score relatively high for their subjective-wellbeing. This could signify that subjective-wellbeing is not strictly dependent on financial wealth but highly dependent on their cultural values.

Summary statistics – Suicide mortality rates

Country	Mean	Std. Dev	Min	Max
Australia	12.3	0.744	11.8	13.4
Austria	17.325	1.711	16	19.8
Belgium	20.975	1.087	20.3	22.6
Brazil	5.825	0.457	5.2	6.3
Canada	12.5	0.183	12.3	12.7
Chile	10.75	0.911	9.9	12
China	10.175	0.556	9.8	11
France	18.675	1.394	16.9	20.2
Germany	13.775	0.556	13.4	14.6
India	17.025	0.929	15.7	17.8
Indonesia	3.075	0.126	2.9	3.2
Italy	7.4	0.392	7	7.9
Japan	23.25	2.439	19.6	24.7
Luxembourg	13	2.121	11.1	15.9
Malaysia	5.6	0.294	5.3	5.9
Mexico	4.15	0.661	3.4	5
Norway	11.9	0.956	10.9	13.2
Poland	22.125	1.014	20.7	23.1
Russia	29.525	8.251	20.1	38.7
Singapore	11	0.920	9.9	11.9
South Africa	10.15	0.412	9.7	10.7
South Korea	27.025	8.647	14.8	34.1
Switzerland	17.35	3.009	14.5	20.6
Taiwan[3]	NA	NA	NA	NA
Thailand	13.9	2.510	10.7	16
The Netherlands	10.3	1.068	9.7	11.9
The Philippines	3.175	0.532	2.6	3.8
UK	8.25	0.493	7.7	8.8
US	12.425	1.517	10.8	14.3
Vietnam	6.95	0.387	6.5	7.4

Table 3: Descriptive statistics – suicide mortality rates per 100,000

Suicide rate is another more objective approach to indirectly measure people sense of subjective-wellbeing. From table 3, there does not seem to be a definite pattern for Asia relative to Western countries. However, despite being high developed, it appears that Japan and South Korea are among the most suicidal in this dataset. Although there are exceptions, it seems like highly developed countries have higher tendency to be suicidal. This somewhat

[3] The World Bank has no available suicide data for Taiwan; Taiwan is not identified as an autonomous state by the UN

contradicts with the hypothesis of the thesis which presuppose that people in higher income nations are overall more satisfied with their lives.

It is conjectured that the hypothesis still holds true. However, there is probably a confounding variable in this case. The more developed a country is, the less religious (more atheistic) it usually become. One should expect to see lower suicide rates in more religious countries since it is often associated with immorality. This seems to hold true since lower suicide rates are predominant for relatively more religious countries like the Philippines, Malaysia, Indonesia, Mexico, Brazil, etc. Therefore, suicide rate may not be the most ideal measure for the well-being of people since religion could be a confounding factor. Thus, robustness is tested by using a number of well-being variables.

Summary statistics for the variable private debt to GDP can be found in section 7.2 of appendix B. Similar to the study of Chui et al. (2010), private debt to GDP is used as a proxy for financial market development. The country with the highest time series mean private debt to GDP is Luxembourg with a ratio of 3.51. This is followed by the Netherlands with 2.328, Hong Kong with 2.088, Norway with 2.051, Switzerland with 1.912, and Belgium with 1.804. Therefore, this proxy seems to be quite reasonable since the aforementioned countries are some of the world most developed financial markets.

3.1.2 Momentum trading strategy

Before it is possible to perform any regression analysis in pursuit of uncovering the driving force behind momentum effects, one first needs to calculate returns of the momentum trading strategy for each stock exchange for the entire test period. There are multiple ways to implement the momentum trading strategy, however, this thesis will follow the original for ease of comparisons. The original strategy used by Jegadeesh and Titman (1993) is called the “J-month/K-month strategy”, where J represents the evaluation period one uses to select the stocks while K represents the holding period of the selected stocks.

Using the evaluation period, the compound return over the evaluation period (J) is calculated for each stock. Following the methodology of Jegadeesh and Titman (1993), returns on stocks are sorted into deciles. The top decile stocks with the highest returns are considered as the winners while the lowest decile stocks are considered as losers (L). Long positions are taken on winners (W) while shorts positions on taken on losers (L) corresponding

to the holding period (K).[4] The W and L portfolios are equally weighted. The porfolios are rebalanced at the end of the evaluation period, i.e. after K months. The zero-cost portfolio is simply W portfolio minus L portfolio (WML).

Jegadeesh and Titman (1993) considered a different combinations of J= 3, 6, 9, 12 and K = 3, 6, 9, 12. In this thesis, the thesis will investigate all combinations for some of the less studied Asian countries. It is most likely that different country have different optimal evaluation and holding periods due to a variety of unknown factors. This might leads to some interesting patterns and findings. Furthermore, momentum profits especially with the Asian countries are investigated in order to resolve whether the findings of Griffin, Jin and Martin (2003) were unfairly impacted by the 1997 Asian Financial Crisis.

Nevertheless, in order to ensure consistency when performing further analysis and regressions, only one single 'J-month/K-month strategy' will be applied across all countries. This allows one to perform regression analysis with momentum returns the dependent variable in a consistent manner. The thesis uses the J-6/K-6 strategy which had been the main focus in the original Jegadeesh and Titman (1993) and is also the one used in Chui et al. (2010), which this thesis took inspiration from. Importantly, this would allow ease of comparisons.

3.2 Regression analysis

3.2.1 Fixed effect model

Once panel data of monthly momentum returns are calculated for all the countries mentioned in section 3.1.1, further analyses to uncover the momentum effect driving force. The idea is to match the monthly realized momentum profit and independent variables to the same corresponding month in order to run more complicated panel data model such as the fixed effects model. Since Chui et al. (2010) variable of interest –individualism index – is time-invariant, they could not use the fixed effects model, relying instead on the Fama-Macbeth (1973) procedure. Thus, by using the time-variant life satisfaction variables, this problem is partly circumvented.[5] The advantage of a fixed effect (FE) model is that it automatically eliminates (controls) for time-invariant characteristics of a particular country. For instance, a time-invariant characteristic of a country might be the number of official languages spoken in a country, which may hinder the efficiency of information diffusion. Another example would be the harsh climate or tendency for natural disaster of a particular country, which would cause people to invest a larger proportion of resources towards safety. FE model allows one to control these

[4] Only if the losers experience negative compound returns during the evaluation period that short positions are taken on them.

[5] See how individualism or overconfidence is related to life satisfaction in section 2.2.5.

without need of time-invariant data. This is highly powerful since it is in practice impossible to control for all external influences with regular panel regression.

Equation (1):

$$Momentum_{it} = \beta_0 + \beta_1 Happiness_{iy} + A_{iy}\beta_2 + Q_{iq}\beta_3 + \alpha_i + \varepsilon_{jt}$$

Equation (2):

$$Momentum_{it} = \beta_0 + \beta_1 \Delta Income_{iy} + A_{iy}\beta_2 + Q_{iq}\beta_3 + \alpha_i + \varepsilon_{jt}$$

The dependent variable $Momentum_{it}$is simply the momentum return for country i in month t. For the fixed effects mode, α_i is the decomposed error term consisting of the country i's specific time-invariant characteristics. The independent variable $Happiness_{iy}$ is one of the life contentment indices. The alternatives which are considered are: Human Development Index (HDI), suicide rate (per 100,000), GDP growth rate (rGDP), and the Cantril ladder (Ladder) from the World Happiness Report, which is measured from a scale of 0 to 10. Detailed explanation for these contentment measures are discussed in section 2.2.5. A_{iy} is a vector consisting of independent variables for control that are varied yearly. The independent variable $Politics_{iy}$ is the political risk of a country i in year y. Political risk might cause reluctance for investors to react to information until the political situation becomes more definite. This may lead to underreaction which may partly generate the price momentum phenomoen; this should be controlled for. Political risk is measured on a scale of 0 to 1; the value of 1 conveys maximum risk. Another example of independent variable in this vector in the GINI index. The GINI index is used in the circumstance where $\Delta Income_{iy}$ is used as the variable of interest. For $\Delta Income_{iy}$, rGDP measure is used. From section 2.2.5, it is known that high income inequality may be inversely related to the happiness or life satisfaction of the individual since people have a tendency to compare themselves with others. The GINI index is measured on the scale of 0 to 100, where 0 is perfect equality among the people while 100 is perfect inequality.

$Q_{iq}$is a vector consisting of independent variable for control that are varied quarterly. An example is the ratio of private debt to GDP where quarterly data is available. The percentage of institutional investor would be a good proxy to control for the degree of financial market development. Nevertheless, this data is readily and coherently available and for large samples of countries. For this reason, the ratio of non-financial private debt to GDP is instead use to proxy for the degree of financial market development. Chui et al. (2010) also used the ratio of private debt to GDP to control for financial market development. Since the testing period lasts over 17 years, it is highly that financial market gets more developed over time. To prevent problems associated non-stationarity, e.g.

spurious correlation, the first difference is taken to stationarize the set of series. In particular, private debt is stationarized into the change in ratio of private debt (dPrivatedebt).

Using the fixed effects model, it is not possible to test third hypothesis, because the individualism index is a time-invariant variable. For this reason, hypothesis 3 is test in the subsequent section with the Fama-Macbeth (1973) regression instead.

3.2.2 Fama-Macbeth (1973) procedure

Fama-Macbeth (1973) procedure is also used due to its simplicity and commonality. Moreover, it allows the variable of interest to be time-invariant. This is an important feature with dealing with the time-invariant Hofstede's indices. In this thesis, the Fama-Macbeth (1973) procedure is corrected for heteroskedasticity and autocorrelation up to six month lags.

Equation (3):

$$Momentum_{it} = \alpha_0 + \alpha_1 Happiness_{iy} + C_i\beta_1 + A_{iy}\beta_2 + Q_{iq}\beta_3 + \varepsilon_{it}$$

Equation (4):

$$Momentum_{it} = \alpha_0 + \alpha_1 \Delta Income_{iy} + C_i\beta_1 + A_{iy}\beta_2 + Q_{iq}\beta_3 + \varepsilon_{it}$$

Equation (5):

$$Momentum_{it} = \alpha_0 + \alpha_1 Culture_i + C_i\beta_1 + A_{iy}\beta_2 + Q_{iq}\beta_3 + \varepsilon_{it}$$

The dependent variable $Momentum_{it}$ is simply the momentum return for country i in month t. Similar to the fixed effects model in section 3.2.2, the independent variable $Happiness_{iy}$ is any one of the life contentment indices. C_i is a vector consisting of time-invariant variables controlling for country i. An example is the number of official language (Lang) spoken in country i. It is postulated that higher the number of languages spoken in a country, the higher the inefficiency of information transmission. This may lead to underreaction to stock information. Similarly, A_{iy} is a vector consisting of independent variables for control that are varied yearly and Q_{iq} is a vector consisting of independent variable for control that are varied quarterly. The constituents of these vectors are similar to the FE model in section 3.2.1. Moreover, problem with non-stationarity is taken care of by taking the first difference. For instance, instance private debt is transformed into the change in ratio of private debt (dPrivatedebt). Overall, equation (3) and equation (4) are to a certain extent similar to the equations (1) and (2) of the FE models.

The variable $Culture_i$ is any of the time-invariant variable of interests related to cultural tendencies. Four alternatives of the Hofstede's (2001) survey-based indices are considered. Firstly, the individualism index was used in the work of Chui et al. (2010). The individualism index measures the importance of one own abilities relative to the dependence on the organization (e.g. job training); this index is the opposite of collectivism (Hofstede, 1983). Refer to section 2.2.4 for further elaboration on the index. The second alternative is the Hofstede's masculinity index. The masculinity index measures the extent which people value achievement and material success relative to other more feminine features such as altruism, compassion or cooperation (Hofstede, 1983). The third alternative to be considered is the power distance index. This measures the extent which unequal power to one's superior is deemed acceptable (Hofstede, 1983). Last alternative is the indulgence index. It measures the degree to which people submit to gratification as opposed to restraining themselves from basic pleasures (Hofstede, 2001). All of these indices are measured on a scale of 0 to 100. For example, a score of 0 on the masculinity index suggests absolute 'femininity' while a score of 100 suggests absolute 'masculinity'.

3.2.3 Vector autoregression (VAR)

Equation (6):

$$\boldsymbol{Mom}_t = \phi_0 + \phi_1 \boldsymbol{Mom}_{t-1} + \phi_2 \boldsymbol{Mom}_{t-2} + \boldsymbol{\varepsilon}_t$$

From the vector autoregressive model (VAR) in equation (6), the dependent vector $\boldsymbol{Mom}_t$ consists of the momentum returns for the selected countries at month t. The dependent vector is being auto-regressively regressed on the first and second monthly lagged momentum return vectors. The lag length of two months is utilized since it is probably plausible to assume that if even if the relation exists, it is should probably last only shortly. In any case, if the lagged vectors appear to be systematically significant, more lags are to be experimented with. Importantly, the objective of this model is to observe whether momentum returns of different countries have spillover effects on each other.

Since the interest of this thesis lies particularly on Asian markets, the model is a few selected major financial Asian markets. These selected powerful Asian economies are highly reliance on each other in terms of trade and for their culturally ties, making them ideal choices for the vector autoregressive model. The selected markets include: China (Shanghai), Hong Kong, Japan, Singapore, South Korea, and Taiwan. In addition, the VAR model allows one to perform the Granger causality test. This makes it possible to see if momentum return of a certain country systematically precedes another. In other words, it allows to see if the spillovers are one-sided.

4. Results and Discussion

4.1 Momentum returns

Mean monthly momentum trading returns J: 6 K: 6 Strategy from 01/01/2001 until 28/02/2017

Country	WML	W	L
Australia	-1.341% (-3.57)	1.324% (2.86)	2.665% (4.45)
Austria	0.044% (0.15)	1.013% (4.02)	0.969% (2.94)
Belgium	-0.390% (-0.98)	0.612% (2.17)	1.001% (2.20)
Brazil	-1.284% (-3.27)	1.271% (2.89)	2.555% (5.00)
Canada	-0.202% (-0.64)	1.226% (3.57)	1.427% (3.06)
Chile	0.810% (3.35)	1.343% (5.45)	0.532% (2.01)
China	-0.533% (-1.56)	0.784% (1.26)	1.317% (1.88)
France	-0.263% (-0.87)	0.610% (2.39)	0.873% (2.03)
Germany	-0.545% (-1.58)	0.796% (2.34)	1.340% (2.54)
Hong Kong	-0.087% (-0.26)	1.363% (2.64)	1.451% (2.24)
India	0.910% (2.07)	2.885% (4.33)	1.975% (2.33)
Indonesia	1.018% (2.79)	1.626% (3.74)	0.608% (1.12)
Italy	0.511% (1.38)	0.298% (0.93)	-0.213% (-0.39)
Japan	-0.389% (-1.40)	0.719% (1.75)	1.108% (2.33)
Luxembourg	0.437% (0.87)	1.056% (2.70)	0.619% (1.08)
Malaysia	-0.222% (-0.80)	0.685% (1.73)	0.907% (1.88)
Mexico	0.468% (1.52)	1.465% (5.60)	0.997% (2.85)
Netherlands	0.088% (0.31)	0.477% (2.27)	0.389% (1.08)
Norway	0.708% (1.82)	1.047% (2.69)	0.340% (0.61)
Philippines	-1.759% (-4.32)	1.057% (2.29)	2.816% (5.07)
Poland	0.323% (0.85)	1.360% (3.37)	1.037% (1.91)
Russia	-1.083% (-2.25)	0.880% (2.70)	2.065% (4.57)
Singapore	-0.058% (-0.14)	0.763% (1.69)	0.821% (1.31)
South Africa	-0.123% (-0.45)	1.666% (5.96)	1.789% (5.30)
South Korea	-0.150% (-0.43)	1.376% (2.86)	1.526% (2.75)
Switzerland	0.363% (1.34)	0.602% (3.41)	0.239% (0.71)
Taiwan	-0.711% (-1.59)	0.665% (1.36)	1.376% (2.04)
Thailand	0.362% (1.28)	1.676% (4.11)	1.314% (2.81)
UK	0.773% (2.86)	0.926% (3.40)	0.153% (0.37)
US (NASDAQ)	-0.567% (-1.59)	0.990% (2.59)	1.558% (2.83)
US (NYSE)	-0.050% (-0.13)	1.075% (3.03)	1.124% (2.13)
Vietnam	-0.996% (-1.78)	0.069% (0.11)	1.065% (1.12)

Table 4: Mean monthly return J: 6, K: 6 momentum portfolios for each country. Winner minus Loser (WML) is a zero-cost portfolio where the winners (W) of the past 6 months are longed while the losers (L) of the past 6 months are shorted.

From table 4, the momentum returns seem to be overall lower in magnitude compared to the existing literature. This is most likely due to the fact this dataset excludes delisted firms (e.g. Eisdorfer, 2007; Huyunh & Smith, 2017). For this reason, these results seem to be consistent with the literature where momentum return is mostly driven by bankrupted delisted firms. It is important to stress that due to this methodology, the loser (L) portfolios should be positively inflated to a degree. This, in turn, lead to overall lower WML returns. Nevertheless, excluding delisted firms, the generated momentum returns allow better context to investigate momentum returns that are strictly derived from psychological biases of investors, e.g. those attributed to underreaction and overconfidence of investors. It is interesting to see that not all momentum returns vanish. This suggests that there are other factors, aside from bankrupted firms, driving these momentum returns.

Indonesia exhibits the highest and significant momentum return of 1.018% per month (or an annualized return of 12.92%). This is followed by India. India shows a significant momentum return of 0.910% per month (or an annualized 11.48 per annum). Chile also exhibits the high and significant momentum return of 0.810% per month (or an annualized return of 10.16%). This is followed by the United Kingdom with 0.773% per month (or an annualized return of 9.68%). Norway's momentum return is significant at 10% level with a mean monthly return of 0.708% (or an annualized return of 8.83%). The fact that Japan, Taiwan and South Korea display negative momentum returns is consistent with the literature of Chui et al. (2010).

In older literature, it appears that India is somewhat an outlier in Asia when it comes to momentum profit. Excluding Oceania, India was the only Asian nation to have significant mean momentum profit (at 10% significance level) in the study of Griffin et al. (2003). Consistently, using relatively newer dataset, Chui et al. (2010) found that India has a mean momentum return of 1.138%, which was again the highest of all Asian nations included in the study. On the other hand, significance momentum return in Indonesia seems to be a more recent phenomenon. This was not found in either Griffin et al. (2003) or Chui et al. (2010). Further breakdown of the summary statistics for the zero-cost 'winner minus loser' (WML) portfolio for each country can be found in appendix A.

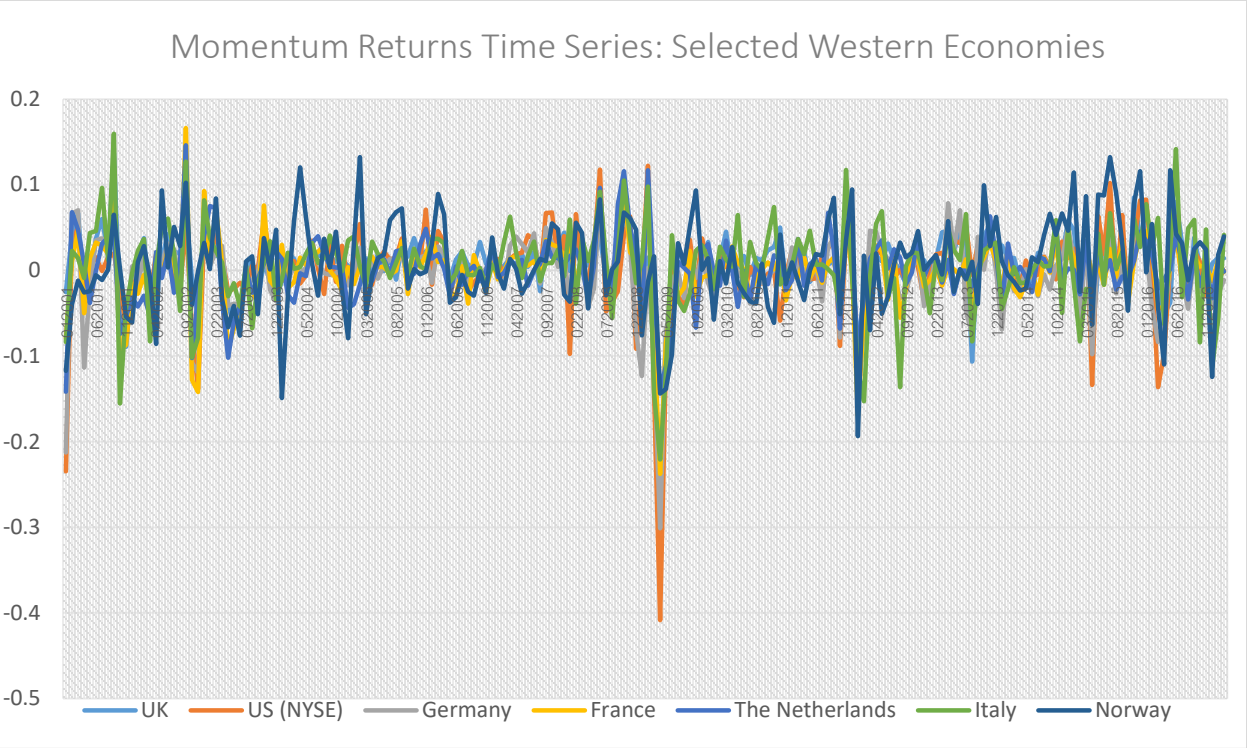

Figure 2: Momentum returns plot for France, Germany, Italy, the Netherlands, Norway, UK, and US from January 2001 to February 2017

From figure 2, it appears that the period prior to the Great Recession, these western economies experienced small positive and steady momentum returns. The 2008 Great Recession led a huge negative shock to momentum returns. For instance, the momentum return for the NYSE had led to over a 40% monthly loss as seen in figure 2. For this reason, it is clear that the calculated average momentum returns in table 4 would have been higher if the Great Recession were not to take place. From the time series of figure 2, it is quite clear that the momentum trading strategy had led to large losses during the 2008 Financial Crisis. This is actually quite surprising. It is known that the momentum trading strategy requires longing the top decile while shorting the bottom decile. This should theoretically hedge each other against market risk factor. Nevertheless, figure 2 suggests that the hedge is not to be immune to the recession. One line of argument for this is the restoration of rationality in times of crisis as explored in section 2.1.5. Hwang and Salmon (2004) proposed the market crises cause people to turn toward fundamental analysis rather than herding along with the market. It helps correct irrationality. This could be one plausible reason why price momentum disappeared in the recession. However, this mechanism is exceptionally hard measure or prove empirically. Similarly, in the early 2000s, there were some losses for the strategy. It is perhaps not coincidentally that these periods coincide with the dotcom bubble. The market panic may have restored rationality and diminished price momentum.

The research proposes the life contentment mechanism as seen in section 2.2.5. The financial crisis had led to severe losses in wealth and jobs. This created a lot of unhappiness. All of a sudden, people now prioritize their personal finances highly over their leisure or other pursuits. This weakens underreaction to financial information and should lessen the price momentum phenomenon. According to Daniel et al. (1998), bad public news are mainly disregarded by the investors via the self-attribution bias mechanism. It is not clear if an impactful event like the Great Recession would still be regard as bad luck or the investor's own failure to foresee the bubble. If investors regard the recession as simply noise, then their overconfidence would not be hampered. Therefore, momentum effects should still be observed if one would follow Daniel et al.'s (1998) model. Apparently, this is not the cases. Overconfidence may have been hampered by the recession. Further analysis in later sections are made to help indicate the actual path at play.

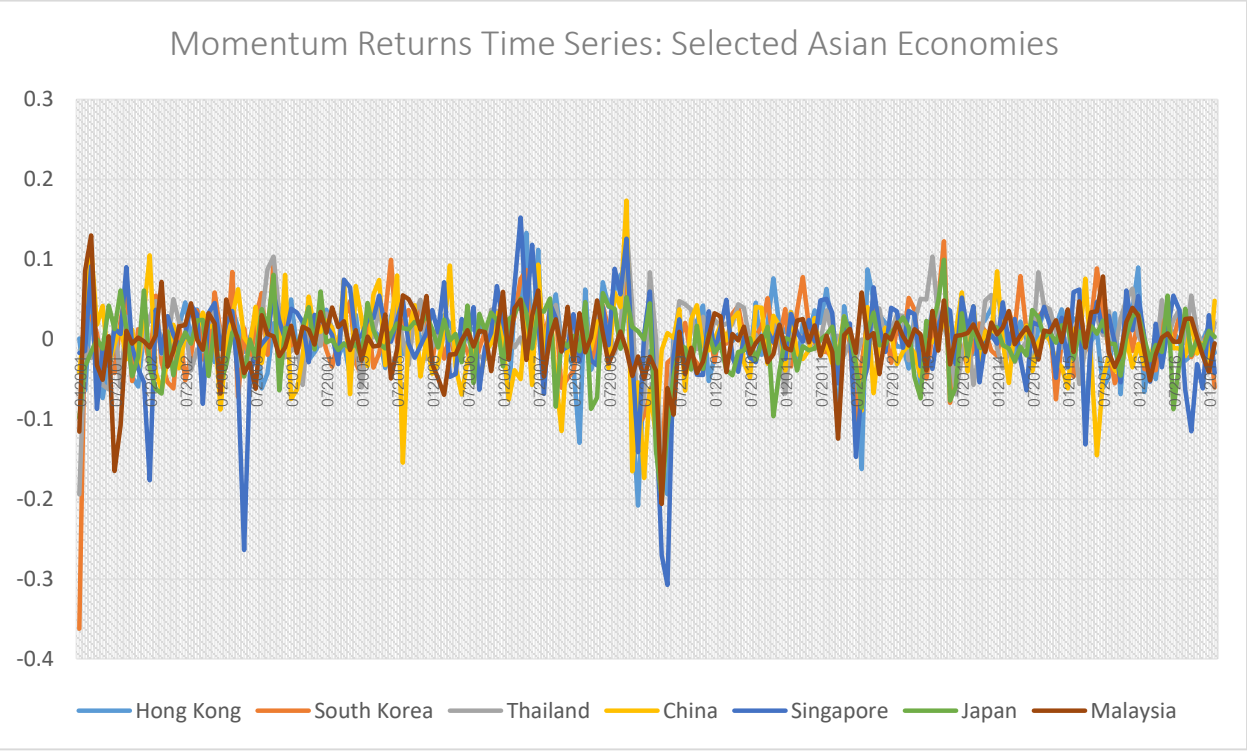

Figure 3: Momentum returns plot for China, Hong Kong, Japan, Malaysia, Singapore, and South Korea from January 2001 to February 2017

Overall, it is known that the Asian economies were much less impacted by the 2008 Financial Crisis as measured by the GDP growth rates. In fact, the GDP growth of China was actually relatively stable at around 9.4% in 2009,

according to the World Bank database. Yet, from figure 3, the momentum strategy had surprisingly led to some large losses during the Great Recession. Thus, it seems that price momentum is not strictly related to market risk.

Nevertheless, it could be that the on-going crisis at the time led people to become much more cautious with their finances. Reconciling this with the proposed Maslow's framework, people began to place higher emphasis on security and survival during the recession. Therefore, their sensitivity to financial-related news became less desensitized. This leads to lower underreaction and thereby diminishes the price momentum phenomenon.

In this case, the model of Daniel et al. (1998) does not seem to be explanatory. During the recession, the Chinese economy overperformed by a large margin relative to other economies. If anything, Daniel et al. (1998) model would let one to believe that this should further increase the confidence of Chinese investors via biased self-attribution. As long as overconfidence exist, they show that momentum effect is perpetuated.

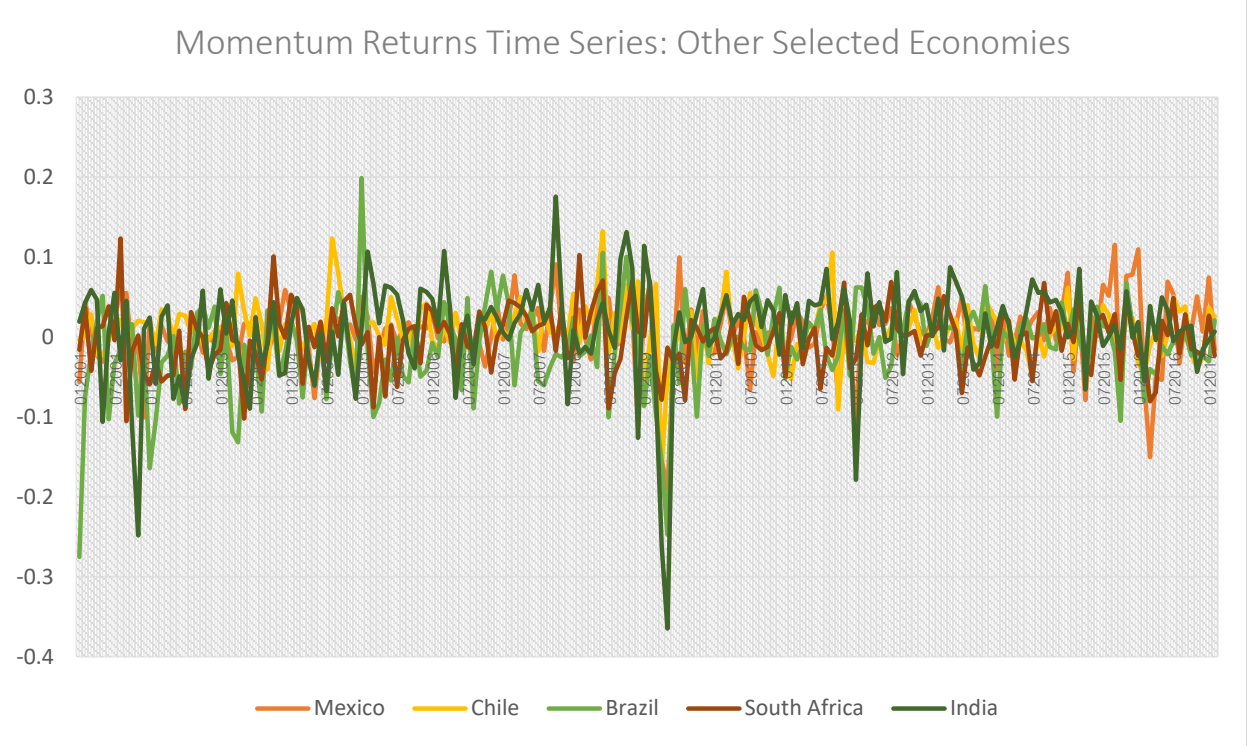

Figure 4: Momentum returns plot for Brazil, Chile, India, Mexico, and South Africa from January 2001 to February 2017

It appears from figure 4 that India had experienced the same scenario to China during the Global Recession. According to the World Bank database, its GDP growth rate was at 3.9% in 2008. This is roughly its average growth rate for the past five decades. Yet, India experienced huge losses for momentum trading strategy during the financial crisis. Risk based explanation does not seem explanatory. If the market as a whole does not make any losses (and actually even gained by 3.9%), it is not clear what risk momentum profit is compensating for. This is why behavioral explanations, such as Hwang and Salmon (2004) or the thesis's proposed framework, seem more plausible. Particularly, the global financial panic cause investor to act more in accordance to rationality.

4.2 Fixed effects model

Fixed Effects Models: Momentum Effects and Life Contentment

Dependent variable: monthly momentum return

	Model 1: Objective Well-being	Model 2: Income and Inequality	Model 3: Revealed Well-being	Model 4A: Subjective Well-being[6]
dHDI	0.81090833*** (4.23)			
Ladder				0.00860877*** (2.74)
PoliticalRisk	0.00532912 (0.2)	-0.0309953 (-0.67)		-0.08377683** (-2.28)
dPrivatedebt	-0.0010099 (0.17)			
rGDP		0.4029435*** (8.79)	0.12545635* (1.79)	0.37007314*** (10.20)
GINI		0.0006457 (0.77)		
Suicide			-0.00094046 (-1.52)	
Constant	-0.00647075 (0.32)	-0.0116874 (-0.26)	0.00869027 (1.07)	-0.00293191 (-0.09)
Country fixed effect	Yes	Yes	Yes	Yes
Time fixed effect	No	No	No	No
F	6.08 (0.0004)	27.07 (0.0000)	2.33 (0.0973)	37.63 (0.0000)
N	4806	2100	1416	3432

Table 3: Fixed effects regressions

[6] Refer to model 4B in section 7.3 appendix C for the same FE model but with fixed time effect

Model 1: Objective well-being

In model 1, the human development index (HDI) provided by the World Bank is used as a proxy for life satisfaction. Since not all the HDI series are stationary, the first differences are taken. From the result of table 3, it appears that the yearly first difference in HDI (dHDI) can positively explain momentum return. Since the HDI is measured in on a scale of 0 to 1, it can be view in terms of percentages. An increase of 1 percentage point in yearly HDI leads to 0.811% percentage point in monthly momentum return. Nevertheless, referring to the dataset, in the majority of cases, dHDI is well below 1%. The median dHDI is 0.400%.

To be conservative, it is first hypothesized for the fact that financial infrastructure could improve over time. The ratio private debt to GDP is used to proxy for this similar to what Chui et al. (2010) did in their study. The more well-developed the financial market is in an economy, one should expect the higher ratio of private debt to GDP. In order to prevent the problem associated with non-stationarity, the first difference of private debt is also taken. However, in this case, the change of private debt ratio is insignificant, signifying that the level of development of the financial market is not explanatory for momentum profits. An important side-note for this model is if the true infrastructure development which the model attempts to control for is actually fixed in the testing period, the fixed effect model would inherently have already controlled for this. Yet, even if this is the case, the life satisfaction proxy here, dHDI, is still explanatory.

The lack of significance for the financial market development (dPrivatedebt) could mean that the level of financial development (dPrivatedebt) is not a precursor for momentum returns after controlling for well-being. This result answers existing puzzle in the current literatures to an extent. In particular, the puzzle of Griffin et al. (2003) where price momentum seem to exist mostly in well-developed financial markets. The result of this thesis seems to suggest that momentum profits exist in well-developed financial markets not necessarily because of the well-developed financial markets development themselves. Rather, people in well-developed financial markets have higher tendency to be satisfied with their lives, and this in turn causes the price momentum to exist.

Model 2: Income and income inequality

Although it has been show that income inequality in the US is linked to unhappiness from the evaluation of fairness (Oishi, Kesebir, & Diener, 2011), it is not clear what the relationship to human motivation is. The first case is, higher income inequality leads to higher motivation to gain material wealth. If this is the true case, linking to the thesis's proposal, high income inequality should lead to lower momentum profits. The alternative case is, high income inequality may actually cause discourage people from attempting to gain material wealth. If this is the true case, then people would start prioritizing other areas of life to gain happiness such as friendship or charity. Therefore, higher income inequality should lead to higher momentum returns due to underreaction to financial-

related signals. Nevertheless, from table 3, empirically there is not enough for either of this case. After controlling for political risk and growth in national income (rGDP), the coefficient for the GINI index is 0.00065. However, the t-statistics is insignificant at 0.7. It is possible that both suggested cases are at play, cancelling out each other's effect. Overall, it seems that income inequality is not a major determinant whether momentum return is realized in a particular country. The growth in GDP (rGDP), on the other hand, is positive and significant at 1% level. An increase GDP growth by 1 percentage point leads to about 0.403 percentage point increase in monthly momentum returns.

Model 3: Revealed Well-being

While the sign of suicide is what is expected, it appears the test does not have enough power to reject the null at 5% level. This is probably due to the limited yearly data on the suicide rate of each country. Higher suicide rate is assume to imply lower overall happiness in the society. Therefore, higher unhappiness leads to lower momentum returns. Higher suicide rate implies that the Maslow's hierarchy of needs is overall being less met in a particular country. As argued in section 2.2, higher unhappiness is assumed to be correlated with higher share of people struggling with the with the bottom levels of Maslow's hierarchy of needs. The bottom levels often deal directly with personal finances, such as debt struggle or debt spiral. National income, on the other hand, should partly resolve this. The rGDP is significant at 10% but has a smaller p-value than the previous model. This is expected because national income and suicide rate should be somewhat negatively interrelated in relation to momentum, thereby dampening the effect after controlling the counterpart. If GDP growth increases by 1 percentage point in a year, this is associated with a 0.125 percentage points increase in monthly momentum returns.

The result might raise the issue of reverse causality. Although reverse causality cannot be tested empirically in the case, momentum return in fact should not lead to value addition to the economy; it is an opportunity presumably due to mispricing. Thus, it is argued that the value-added to the economy as measured in GDP causes momentum returns (via increase in life contentment) but not vice versa. High momentum returns should not imply higher GDP, since no productive capacity is being built. Rather, it should be simply a redistribution of profits from other investors who underreact or overreacted.

Model 4: Subjective well-being

Model 4A of table 3 portrays the effect of Cantril's ladder (Ladder) on momentum returns. It appears that the subjective well-being ladder can positively explain momentum returns, even after controlling for the change in income and political risk. The ladder is a 10-point scale. An increase in the ladder by 1 point per year leads to 0.00861 percentage point increase in momentum returns. This is consistent with the first hypothesis of the thesis. Although an increase in income should increase well-being, the shows that there is more to well-being than just

money. The ladder is able to capture the effect not captured by the growth in GDP. This is also after controlling for time-invariant characteristic of the country natural to the fixed effect model.

The thesis posits that political risk might be associated with underreaction due to investor's reluctance to invest. This is especially relevant for international investors. The political risk index is measured between a scale of 0 to 1, where 0 conveys maximum political risk and 1 conveys no risk. In this model, the political risk index appears to be negatively associated with momentum returns. A higher score in the political risk index means higher stability. Higher political stability seems to lead to lower momentum returns. If the political risk index rises by 0.01 point, there is a fall of 0.084% in monthly momentum profit. Nevertheless, the robustness of this variable is questionable. Political risk appears not to be significant in other models. Similarly, Chui and Titman (2010) in fact did not find this variable to be significantly explanatory.

The fixed time effects are additional controlled for in model 4B to check for robustness of model 4A. Model 4A is found in section 7.3 appendix C. It appears that the Cantril ladder's (Ladder) coefficient is 0.00553 and is significant at 10% level. It could be that case that due to the large number of parameters from the yearly dummy variables, this may inherently reduce the power of the test to reject the null. Higher multi-collinearity have inflated the standard errors. Nevertheless, GDP growth rate (rGDP) appears to still be significant at 1% level and its coefficient is 0.148. An increase in GDP growth of 1 percentage point leads to an increase in monthly momentum return of 0.148 percentage point, after controlling for time effect. This seems like a more plausible estimate.

4.3 Fama-Macbeth (1973) procedure: Life contentment and momentum effects

The Fama-Macbeth (1973) is used to test for the robustness of the results of the fixed effects models. Newey-West standard errors correction is implemented to control for autocorrelation and heteroskedasticity. The selected lag for the procedure is 6 months.

Fama-Macbeth (1973) Procedure: Momentum Effects and Life Contentment

	Panel A: Objective Well-being	Panel B: Income	Panel C: Subjective Well-being
Ladder			0.0005333
			(0.54)
dHDI	0.31484391*		
	(1.86)		
rGDP		0.0779497***	0.0612926**
		(2.86)	(2.03)
dPrivatedebt	-0.00408229	-0.0069532	
	(0.45)	(-0.71)	
Lang	0.00026531	0.0003128	
	(0.97)	(1.10)	
PoliticalRisk	0.00502628	0.0074264	0.0038053
	(0.75)	(1.10)	(0.38)
Constant	-0.00463558	-0.0074061	-0.0073672
	(-0.99)	(-1.65)	(-1.39)
F	1.29 (0.2756)	2.78 (0.0287)	1.52 (0.2135)
N	4638	4638	3432
No. time periods	166	166	132
R-squared	0.1819	0.1877	0.1641

Table 4: Fama-Macbeth (1973) regressions

Panel A: Objective well-being

The Fama-Macbeth (1973) procedure is corrected for heteroskedasticity and autocorrelation up to six month lags using Newey-West standard errors. Similar to the fixed effect model in section 4.2, it appears that the change in HDI, proxy for life contentment, can positively explain the momentum returns at the 10% significance level. Since HDI is measure in the scale of 0 to 1, a yearly increase of 1 percentage point in HDI leads to an increase in monthly momentum return of 0.315 percentage point. Private debt is used as a proxy for the degree of financial development in the market. Nevertheless, it again appears that the degree of financial development is not

explanatory of momentum profits. The variable Lang is the number of official language spoken in a country. It is also time-invariant. Presumably, a larger number of languages spoken in a country should negatively affection information transmission efficiency. Hence, this should theoretically leads to an underreaction to stock information. However, although the sign of the coefficient is positive, language appears not be significant in the model.

Panel B: Income

Panel B of table 4 attempts to look at the robustness of the change in income in explaining momentum return variation while accounting for other factors. It appears that rGDP is still significant with a coefficient of 0.0780 and t-statistics of 2.86. This implies that an increase in GDP growth of 1 percentage point leads to 0.078 percentage point increase in monthly momentum profit.

Unlike the fixed effects model, the Fama-Macbeth (1973) does not control for time-invariant factors. This is one of the major downsides since there are probably multitude of other factors which are unknown to the current literature. Therefore, they remain unaccounted for in the model. This could be the reason why there is large change in the coefficient between the Fama-Macbeth's (1973) estimate and the fixed effect model's estimate.

Panel C: Subjective Well-being

The regression model attempts to look at the robustness of the fixed effect model with the subjective well-being as the explanatory variable. In panel C of table 4, it appears that the Cantril's ladder (Ladder) becomes insignificant (t= 0.54) under the Fama-Macbeth (1973) regression. The sign of the coefficient is, nonetheless, still consistent with the fixed effects model. The lack of significance could be due other unknown unaccounted variables crowding out the effect; Fama-Macbeth (1973) procedure does not account for country specific fixed error term, leading to more disturbing factors. Nevertheless, the GDP growth remains significant (t=2.03) and positive.

4.4 Fama-Macbeth (1973) Procedure: Hofstede's cultural dimensions

Since Hofstede's cultural dimension indices are time-invariant, the fixed effects model cannot be used to measure their effects. This is the rationale for the Fama-Macbeth (1973) procedure in this subsection.

Fama-Macbeth (1973) Procedure: Hofstede's Cultural Dimensions

Dependent variable: monthly momentum return

	Model A: Individualism	Model A2: Individualism	Model B: Masculinity	Model B2: Masculinity	Model C: Power Distance	Model D: Indulgence
Individualism	0.0000668	0.0000593				
	(0.60)	(0.54)				
Masculinity			-0.000141***	-0.0001404***		
			(-2.96)	(-2.95)		
PowerDistance					0.0000114	
					(0.28)	
Indulgence						-0.0000177
						(-0.44)
PoliticalRisk	0.0104376	0.0114719	0.0032839	0.0034212	0.0025264	0.0031825
	(1.66)	(1.82)	(0.58)	(0.61)	(0.36)	(0.54)
dPrivateDebt	-0.0099477	-0.0106625	-0.0138405	-0.0134845	0.0002706	-0.0032373
	(-0.93)	(-0.98)	(-1.34)	(-1.29)	(0.03)	(-0.33)
Lang		0.0004084		0.0002413		
		(1.53)		(0.92)		
Constant	-0.0109265	-0.0120458*	0.0073075	0.006737	-0.0014079	-0.0006625
	(-1.55)	(-1.70)	(1.49)	(1.35)	(-0.22)	(-0.17)
F	1.41	1.68	3.24	2.33	0.05	0.15
N	4806	4806	4806	4638	4806	4806
No. time periods	168	168	168	168	168	168
R-squared	0.1632	0.1941	0.1536	0.1825	0.1441	0.1579

Table 5: Fama-Macbeth (1973) regressions

Model A: Individualism index

In model A from table 5, the coefficient of Hofstede's individualism index is 0.000067. This means that an increase in the Hofstede's individualism index leads to a 0.0064 percentage point increase in momentum profit. The result from this model challenges the robustness of the result of Chui et al. (2010). The coefficient of the individualism variable found in Chui et al.'s (2010) behavioral model is 0.015% or 0.00015. Either the result of Chui et al. (2010) is not robust to more recent datasets or that the individualism index is mostly associated with overconfidence in delisting firms that heading for bankruptcy.

The individualism variable might be sensitive to other variables in the model. Therefore, the number of official language is additional added in model A2. Seemingly, there is no change in the coefficient of the individualism index. The result questions the robustness of the study by Chui et al. (2010) who found positive relationship between the Hofstede's individualism index and momentum profits.

Model B: Masculinity index

Interestingly, in model B of table 5, Hofstede's masculinity index for cultures appears to be highly significant (t = -2.96). The masculinity index of a country appears to be negatively associated with momentum returns. The masculinity index is measured on a scale of 0 to 100. 100 is the maximum score of masculinity while 0 is the least masculinity score possible. In model B, the coefficient of the masculinity index is -0.000141. This entails than an increase in the masculinity index by 1 in a particular country leads to a reduction in monthly momentum return of 0.00014 percentage point. To check for the robustness of the model, an additional variable is added in model B2. It appears that the variable is still significant (t = -2.95) and is seemingly unaffected by the extra number of official language variable.

The result of this model is quite unexpected. Mentioned in their online appendix, Chui et al. (2010) did not find the masculine index to be significant. It might be important to note the datasets used by Chui et al. (2010) are about 15 years older than the ones used in this thesis. Cultures might have changed during these times. There is also possibility the underlying factors driving price momentum could also change.

In any case, one may expect that if a culture is highly masculine, this should associate with more overconfident and over-investing behavior. This, in turn, should theoretically lead to higher momentum return that is consistent with Daniel et al. (1998). Nevertheless, this is not the case empirically.

It is not completely clear what is the link between masculinity and price momentum phenomenon. It might be helpful to first re-investigate Hofstede's definition for masculinity. Apparently, masculinity dimension refers to the society's emphasis on the importance of financial success, achievements, challenge over more 'feminine'

features such as stability (e.g. job security), comfort or cooperation (Hofstede, 1983). The ranking of the masculinity index can be seen in section 7.4 appendix D.

Compared to the individualism index, which was seen in table 1 of section 3.1.1, Asian cultures perform relatively more highly in the masculinity index. Whereas for the individualism index, Asian cultures score quite poorly. Since Asian cultures are somewhat more 'masculine' by Hofstede's definition, and it is also known the price momentum effects are limited in Asia according to the literatures (e.g. Griffin et al., 2003; Chui et al., 2010), it could be that 'masculine' cultures do not realize momentum profits. Due to the competitive pressure for financial success in 'masculine' cultures, it could be that there is less tendency to underreact to financial information. Investors may be better prepared and pay higher attention to evaluate news sources.

Generally, one might expect masculinity to be linked with overconfidence. But if masculinity is associated with overconfidence, according to Daniel et al. (2010), this should theoretically lead to higher momentum profits. Nevertheless, the thesis's empirical result suggests the contrary.

Model C – D: Other cultural dimensions

According to table 5, it appears that the other Hofstede's cultural dimensions do not appear to be significant at the conventional level. As mentioned in their online appendix, Chui et al. (2010) too did not find any significance for these other cultural dimension. This is quite surprising since one should expect that power distance and individualism to be highly correlated. Actually, the correlation between the individualism index and power distance index for the particular set of countries used in this thesis is highly strong at -0.6684. For this reason, it is strange that Chui et al. (2010) was able to find the individualism index to be explanatory but not for power distance index, given the seemingly high negative correlation. This again questions the robustness of their finding on cultural individualism's explanatory power.

4.5 Vector Autoregression (VAR)

Vector regressive model for the momentum returns of selected Asian economies are investigated. From VAR model in section 7.5.1 of appendix E, it appears that the momentum returns of different countries do not seem to have clear systematic patterns of codependency. More importantly, lagged momentum returns of one own's country/region do not appear to help predict the momentum return for the upcoming period. However, there are a certain number of cases where a country's momentum return is dependent on the lagged of momentum returns of other countries. From section 7.5.1 of appendix E, there are altogether 78 coefficients estimated. One should expect 5% of these to be due to type I error, i.e. roughly 4 false positive. Nevertheless, 11 of the coefficients are

actually significant. Therefore, this is simply more than random chances. It is indeed unclear why these spillover associations exist or what could be driving them. By construction, when applied to a particular market, the momentum trading strategy is ignorant of other markets' performances. Thus, the spillover probably stem from some underlying factors which drive the momentum effects. Employing the model of Daniel et al. (1998), there could hypothetically be overconfidence spillover to other countries. Although the thesis did not find the Hofstede's individualism index in section 4.4 to be explanatory for momentum returns, it could be because the individualism index is static and is unable to capture the monthly variation in momentum returns.

Interestingly, other unexpected patterns are also found while performing the Granger causality tests. From section 7.5.2 of appendix E, the lagged momentum returns of South Korea and Singapore appear to be Granger causal to the momentum return of Hong Kong (p-values = 0.021 and 0.006, respectively). The lagged momentum returns of China and Singapore Granger cause the momentum return of South Korea (p-values = 0.002 and 0.002, respectively). Another notable mention is the lagged Taiwanese and Japanese momentum returns Granger cause Singapore momentum return (p-values = 0.000 and 0.005, respectively). Lastly, lagged Taiwanese momentum returns also Granger cause Japanese momentum return (p-value = 0.000). It is not clear why this pattern is the case. If momentum has spillover effects, e.g. overconfidence spillover, one would expect this to be simultaneous among countries. Nevertheless, Granger causality suggests that this spillover is only one-sided. Future research may want to investigate the underlying propeller behind these unique patterns.

5. Conclusion

This study investigates the underlying psychological and cultural biases responsible for the price momentum phenomenon. Using a large international dataset spanning from the year 2000 to 2017 and composing of 32 stock exchanges[7], including countries from Asia, Europe, Africa, North America and South American, the study was able to find some evidence for the hypotheses. In particular, the cross-sectional dispersion in momentum profits seems to be associated with the level of life contentment as well as certain cultural tendencies like masculinity.

Life contentment proxies appear be positively associated with price momentum phenomenon. In this thesis, it is argued that once a country achieves a certain level of life standard, people then tends to place less emphasis on financial-related signals to focus on 'higher' needs of the Maslow's hierarchy of needs. For this reason, it is argued that well-off cultures tend to underreact to financial-related signals like stock information compared to cultures with poorer well-being. Indeed, the study found well-being to be explanatory for momentum returns. For instance, the Cantril ladder, a subjective well-being measure available from the World Happiness Report, appears to be

[7] Refer to section 3.1.1 for further detail regarding the datasets

explanatory for momentum returns dispersion across countries even after controlling for other relevant and time-invariant characteristics.

Nevertheless, the research results also challenge the study of Chui et al. (2010) who used Hofstede's individualism index, which supposedly proxies for 'overconfidence' and 'self-attribution bias' in the model of Daniel et al. (1998), to explain cross-country variation in momentum returns. The thesis did not find the individualism index to be explanatory for the price momentum phenomenon. Instead, Hofstede's masculinity index is found to be significantly explanatory for momentum returns. Using Hofstede's dichotomy of masculinity and femininity, the result suggests that one can achieve higher momentum profits by avoiding more 'masculine' countries, which tend to strive for material success, and use the strategy in more 'feminine' countries. This contradicts with Chui et al. (2010) who found other Hofstede's cultural variables to be insignificant. This again questions the robustness of their results. Since the datasets used by Chui et al. (2010) are about 15 years older than the ones used for this research, it is also not clear how cultural tendencies might have changed over the past 15 years, e.g. due increasing prominence of Western ideals in the Orient. This, in turn, might affect the momentum phenomenon. For instance, this thesis found price momentum to be a recent phenomenon in Indonesia.

Given recent literatures where momentum profits are found to be driven mostly by delisted bankrupted firms (e.g. Eisdorfer, 2007; Huyunh & Smith, 2017), this thesis undertook an alternative path by excluding them. It is likely that infrastructure and market legislations of different countries can immensely impact the likelihood of bankruptcy for firms. These factors may explain why momentum trading strategy is more profitable in some countries than others, however, they are disturbing factors that could hinder the investigation of cultural and psychological biases on the price momentum phenomenon. This methodology seem to have dampened the magnitude of momentum profits; these results are consistent with Eisdorfer (2007).

Using the vector autoregressive model, the study also found peculiar patterns of momentum returns among Asian economies. The lagged momentum returns seem to have spillover effects to other economies. It is not entirely clear what the link is. A hypothesis for this is there may be overconfidence spillover. Nevertheless, the Granger causality test suggests that these spillovers are one-sided, i.e. from country A to Country B, but not the reverse. Future research may want to investigate this phenomenon.

This research has its limitations. One could argue that there could be psychological biases that are especially associated with firms that have tendencies to file for bankruptcy. This thesis implicitly assumes that investors' psychological biases affect all equities equally in the financial market. Nevertheless, it could also be the case that psychological biases play an overwhelming role in specific type of firms, e.g. distressed firms. If this is truly the

case, since the thesis uses only active datasets, these psychological remain unaccounted for. Until further research disconfirms this assumption, the thesis maintains that the assumption is credible. Another limitation with this thesis is that it is built on the auxiliary assumption that macroeconomic risk is not associated with momentum profits. Generally, the consensus is that the price momentum phenomenon is not related to macroeconomic risks (e.g. Chui et al., 2010). Griffin et al. (2003) did investigate macroeconomic risks on momentum profits globally; they found that momentum profits exist regardless of economic state. Until future studies suggest otherwise, this thesis maintains this auxiliary assumption to be plausible. Otherwise, income-based measure used to proxy for life contentment, such as HDI or GDP growth, could be associated with momentum returns via macroeconomic risk. Nevertheless, it is also found that the Cantril ladder, which is free from macroeconomic risk, is robust. Besides, a long minus short portfolio like in the momentum trading strategy should theoretically hedge each other against market risk.

Further research may want to investigate the theoretical link between masculinity and the price momentum phenomenon and whether 'masculinity' could be reconciled with existing behavioral models. Survey-based subjective well-being measures like the Cantril ladder are not perfect. For example, some cultures are more concealed in sharing their true private well-being while others are more open to do so. A suggestion would be to look at a more medicinal approach. For well-being, for instance, high stress and poor physical health are associated with high hormone cortisol in the body. One could proxy the level of well-being by measure the average level of blood cortisol in a society over time. This would only a more objective approach in measurement. This can then be used to test whether they are explanatory to momentum returns after controlling for relevant factors. Similarly, one could proxy the level of masculinity of a society by measuring the average level of blood testosterone of the population over time. There could be a link between more aggressive investing behaviors and the lack diminishment of the phenomenon. Consistent dynamic data would give higher power to perform econometric tests.

6. Reference List

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7. Appendix

7.1 Appendix A – Momentum returns descriptive statistics

Momentum strategy: zero-cost portfolio (WML) returns

Country	Obs	Mean	Std. Dev.	Min	Max
Australia	194	-0.0134083	0.0523045	-0.2468547	0.2830827
Austria	194	0.0004384	0.0396368	-0.1521763	0.1641184
Belgium	194	-0.0038974	0.0551613	-0.3120387	0.1213999
Brazil	194	-0.0128405	0.0547642	-0.2752886	0.1986076
Canada	194	-0.0020178	0.0440015	-0.180091	0.1082897
Chile	194	0.0081048	0.0336868	-0.1638075	0.1318251
China	194	-0.0053316	0.0474768	-0.1735646	0.173461
France	194	-0.0026302	0.042101	-0.2376057	0.1662349
Germany	194	-0.0054454	0.048062	-0.3011025	0.1221733
Hong Kong	194	-0.0008747	0.0466273	-0.2079543	0.1330723
India	194	0.0090994	0.0611584	-0.3647572	0.1754358
Indonesia	194	0.010176	0.0508341	-0.2305631	0.1248781
Italy	194	0.0051088	0.051573	-0.2208443	0.159475
Japan	194	-0.0038905	0.0386076	-0.1999478	0.0993257
Luxembourg	194	0.0043657	0.0699103	-0.347778	0.2704367
Malaysia	194	-0.0022216	0.0388675	-0.2062556	0.1296888
Mexico	194	0.004678	0.0427269	-0.1902427	0.1150312
Norway	194	0.0070795	0.0540612	-0.1934752	0.1323105
Poland	194	0.0032292	0.0530012	-0.2408925	0.1400355
Russia	194	-0.0118532	0.0671807	-0.3333194	0.1897158
Singapore	194	-0.0005795	0.058066	-0.3072035	0.1521114
South Africa	194	-0.0012328	0.0385798	-0.1054166	0.1231646
South Korea	194	-0.0015015	0.0483135	-0.3620399	0.1226904
Switzerland	194	0.0036285	0.0376082	-0.1849992	0.1598408
Taiwan	194	-0.0071104	0.062469	-0.5300702	0.124269
Thailand	194	0.0036187	0.0392731	-0.1939495	0.1417774
The Netherlands	194	0.000876	0.0388082	-0.14162	0.1460732
The Philippines	194	-0.0175927	0.0567474	-0.304132	0.1278477
UK	194	0.0077303	0.037709	-0.2539161	0.136854
US (NASDAQ)	194	-0.0056734	0.0496689	-0.3680886	0.1155066
US (NYSE)	194	-0.0004963	0.0537276	-0.4083297	0.122216
Vietnam	122	-0.0099569	0.0617467	-0.2704155	0.1812132

7.2 Appendix B – Summary statistics: Financial market development

Summary Statistics: Private debt to GDP (proxy for financial market development)

Country	Obs	Mean	Std. Dev	Min	Max
Australia	192	1.760172	0.1895845	1.403	2.058
Austria	194	1.380881	0.157865	0	1.485
Belgium	192	1.803875	0.2510487	1.453	2.226
Brazil	192	0.5825938	0.0835643	0.469	0.712
Canada	192	1.760234	0.2024454	1.512	2.197
Chile	192	1.123734	0.1519101	0.901	1.456
China	192	1.430375	0.3083185	1.018	2.106
France	192	1.582469	0.1753933	1.332	1.859
Germany	192	1.179344	0.084592	1.062	1.311
Hong Kong	192	2.087578	0.4859264	1.543	3.015
India	192	0.5135	0.1006826	0.326	0.62
Indonesia	192	0.2973906	0.0578235	0.234	0.406
Italy	192	1.100844	0.1623884	0.795	1.273
Japan	192	1.665422	0.0850763	1.553	1.881
Luxembourg	180	3.507367	0.7475532	2.274	4.503
Malaysia	192	1.258938	0.1006738	1.046	4.503
Mexico	192	0.3005156	0.0542632	0.239	0.436
The Netherlands	192	2.327984	0.0964411	2.115	2.47
Norway	192	2.05125	0.2511244	1.566	2.473
Poland	194	0.627	0.1686926	0	0.867
Russia	192	0.4771719	0.1499333	0.214	0.724
Singapore	192	1.371672	0.1952135	1.107	1.798
South Africa	192	0.6788906	0.0691268	0.55	0.79
South Korea	192	1.674313	0.1869726	1.392	1.932
Switzerland	192	1.912297	0.1306135	1.756	2.149
Thailand	192	1.041938	0.1010411	0.899	1.221
UK	192	1.676641	0.1352505	1.387	1.919
US	192	1.526375	0.0899303	1.334	1.694

7.3 Appendix C – FE model with time effect

Fixed Effects Model: Momentum effect and Life Fulfillment (Cantril Ladder)

Dependent variable: monthly momentum return	
Model 4B: Subjective well-being with fixed time effects	
Ladder	0.0055333*
	(1.72)
rGDP	0.1480224***
	(2.72
PoliticalRisk	-0.0036183
	(-0.08)
Year dummies:	
2006	-0.0094008*
	(-1.7)
2007	0.0021171
	(0.42)
2008	0.0044308
	(0.9)
2009	-0.033823***
	(-5.92)
2010	-0.0055804
	(-1.14)
2011	-0.0037265
	(-0.76)
2012	-0.0126427**
	(-2.54)
2013	0.0008964
	(0.18)
2014	-0.0038072
	(-0.77)
2015	0.002524
	(0.5)
Constant	-0.0307481
	(-0.8)
Country fixed effect	Yes
Time fixed effect	Yes
F	17.94 (0.000)
N	3,432

7.4 Appendix D – Masculinity Index

Hofstede's (2001) masculinity index

Rank	Country/Region	Masculinity Index
1	Japan	95
2	Austria	79
=3	Italy	70
=3	Switzerland	70
5	Mexico	69
=6	Germany	66
=6	UK	66
=6	China	66
=9	The Philippines	64
=9	Poland	64
11	South Africa	63
12	US	62
13	Australia	61
14	Hong Kong	57
15	India	56
16	Belgium	54
17	Canada	52
=18	Luxembourg	50
=18	Malaysia	50
20	Brazil	49
21	Singapore	48
22	Indonesia	46
23	Taiwan	45
24	France	43
25	Vietnam	40
26	South Korea	39
27	Russia	36
28	Thailand	34
29	Chile	28
30	The Netherlands	14
31	Norway	8

7.5 Appendix E – VAR

7.5.1 VAR Model

Vector Autoregressive Model (VAR): Momentum returns in Asian Markets

	Coefficient	Z-statistics	P-value
Dependent variable: Hong Kong			
Hong Kong			
L1.	0.0058709	0.07	0.947
L2.	0.1219033	1.43	0.154
South Korea			
L1.	0.264028	2.78	0.005
L2.	0.0193944	0.23	0.819
China			
L1.	0.0219014	0.3	0.761
L2.	-0.1296035	-1.74	0.082
Singapore			
L1.	0.0747256	1.07	0.285
L2.	-0.2082978	-3.07	0.002
Taiwan			
L1.	0.0370214	0.52	0.601
L2.	0.0078788	0.13	0.899
Japan			
L1.	0.0968327	0.98	0.328
L2.	0.0226962	0.23	0.819
Intercept	-0.0006275	-0.19	0.846
Dependent variable: South Korea			
Hong Kong			
L1.	-0.1033623	-1.37	0.172
L2.	0.0987109	1.33	0.182
South Korea			
L1.	0.1464478	1.78	0.075
L2.	-0.0286277	-0.39	0.696
China			
L1.	0.2229047	3.58	0.000

L2.	0.0414637	0.64	0.520
Singapore			
L1.	0.1275797	2.11	0.035
L2.	-0.1653853	-2.81	0.005
Taiwan			
L1.	0.0826639	1.35	0.177
L2.	0.0351229	0.66	0.511
Japan			
L1.	-0.1213189	-1.42	0.157
L2.	0.0868585	1.01	0.311
Intercept	0.0020233	0.73	0.468
Dependent variable: China			
Hong Kong			
L1.	0.0016452	0.02	0.986
L2.	0.079623	0.87	0.384
South Korea			
L1.	0.1372693	1.35	0.177
L2.	0.0282314	0.31	0.756
China			
L1.	-0.055339	-0.72	0.473
L2.	0.0175136	0.22	0.826
Singapore			
L1.	0.0107846	0.14	0.885
L2.	0.0484053	0.67	0.506
Taiwan			
L1.	-0.0541235	-0.71	0.475
L2.	-0.1247464	-1.89	0.059
Japan			
L1.	-0.0638135	-0.6	0.547
L2.	-0.0457949	-0.43	0.666
Intercept	-0.007004	-2.03	0.042
Dependent variable: Singapore			
Hong Kong			

L1.	0.0642422	0.62	0.538
L2.	-0.0060776	-0.06	0.952
South Korea			
L1.	0.1946586	1.72	0.086
L2.	-0.1364979	-1.35	0.177
China			
L1.	-0.0195932	-0.23	0.820
L2.	-0.0984033	-1.11	0.268
Singapore			
L1.	0.0606348	0.73	0.466
L2.	-0.1399147	-1.73	0.084
Taiwan			
L1.	0.3309138	3.93	0.000
L2.	-0.0192023	-0.26	0.794
Japan			
L1.	0.1867401	1.58	0.114
L2.	0.3141096	2.66	0.008
Intercept	0.0018437	0.48	0.631
Dependent variable: Taiwan			
Hong Kong			
L1.	-0.0964252	-1.05	0.296
L2.	0.1416226	1.57	0.116
South Korea			
L1.	0.2918121	2.91	0.004
L2.	0.1415879	1.58	0.113
China			
L1.	0.1597186	2.1	0.036
L2.	-0.0266862	-0.34	0.734
Singapore			
L1.	-0.0421434	-0.57	0.567
L2.	-0.0391014	-0.55	0.585
Taiwan			
L1.	0.1526984	2.05	0.041
L2.	-0.007	-0.11	0.914

Japan			
L1.	-0.1307389	-1.25	0.211
L2.	-0.0128047	-0.12	0.903
Intercept	-0.0029001	-0.85	0.394

Dependent variable: Japan			
Hong Kong			
L1.	-0.0614787	-0.86	0.388
L2.	0.0234246	0.34	0.737
South Korea			
L1.	0.0642793	0.83	0.406
L2.	-0.1075548	-1.56	0.119
China			
L1.	0.0032075	0.05	0.956
L2.	0.0149022	0.25	0.806
Singapore			
L1.	0.0305976	0.54	0.591
L2.	-0.0016768	-0.03	0.976
Taiwan			
L1.	0.2168898	3.77	0.000
L2.	0.1035984	2.06	0.040
Japan			
L1.	0.0486596	0.6	0.546
L2.	-0.0159779	-0.2	0.843
Intercept	-0.0015269	-0.58	0.561

7.5.2 Granger Causality

Granger Causality Test

Equation	Excluded	chi2	df	P-value
Hong Kong	South Korea	7.7724	2	0.021
Hong Kong	China	3.1877	2	0.203
Hong Kong	Singapore	10.387	2	0.006
Hong Kong	Taiwan	0.31128	2	0.856
Hong Kong	Japan	1.0612	2	0.588
Hong Kong	ALL	25.006	10	0.005
South Korea	Hong Kong	3.689	2	0.158
South Korea	China	12.979	2	0.002
South Korea	Singapore	12.089	2	0.002
South Korea	Taiwan	2.5138	2	0.285
South Korea	Japan	2.7768	2	0.249
South Korea	ALL	29.7	10	0.001
China	Hong Kong	0.75632	2	0.685
China	South Korea	1.9216	2	0.383
China	Singapore	0.46907	2	0.791
China	Taiwan	4.4648	2	0.107
China	Japan	0.60437	2	0.739
China	ALL	9.9409	10	0.446
Singapore	Hong Kong	0.38407	2	0.825
Singapore	South Korea	4.7494	2	0.093
Singapore	China	1.2558	2	0.534
Singapore	Taiwan	15.469	2	0.000
Singapore	Japan	10.483	2	0.005
Singapore	ALL	35.619	10	0.000
Taiwan	Hong Kong	3.5994	2	0.165
Taiwan	South Korea	11.042	2	0.004
Taiwan	China	4.6318	2	0.099
Taiwan	Singapore	0.64139	2	0.726
Taiwan	Japan	1.6277	2	0.443
Taiwan	ALL	20.8	10	0.023
Japan	Hong Kong	0.86471	2	0.649
Japan	South Korea	3.099	2	0.212
Japan	China	0.06199	2	0.969
Japan	Singapore	0.28945	2	0.865
Japan	Taiwan	20.645	2	0.000