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INDEX COMPOSITION CHANGES AROUND THE WORLD: A COMPREHENSIVE LITERATURE REVIEW

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APPROVAL

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To My Dearest Family, Professors and Friends...

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INDEX COMPOSITION CHANGES AROUND THE WORLD: A COMPREHENSIVE LITERATURE REVIEW

ABSTRACT

This paper aims to provide a comprehensive literature review on composition changes for benchmark indexes not only for popular indexes such as the S&P 500 but for also global counterparts both in the developed world and the emerging market realm. By shedding light on the phenomena at play for index changes we seek to provide an overview starting from the roots of the literature to modern day works that reflect the current state of the topic and also where it is going. The theme of our study is orientated around the discussion range between information effects associated with index inclusions and exclusions, implications for liquidity, price pressure and demand shocks resulting with demand curve shifts and slopes for the demand curves of stocks and other subtopics such as thematic index composition changes. We dive into whether index composition changes en masse are rooted in information and/or demand driven explanations around the world.

Keywords: price pressure, information effect, abnormal returns, investor awareness, liquidity, shadow costs

DÜNYADA ENDEKS BİLEŞİMİ DEĞİŞİKLİKLERİ: KAPSAMLI BİR LİTERATÜR İNCELEMESİ

ÖZET

Bu makale, yalnızca S&P 500 gibi popüler endeksler için değil, aynı zamanda hem gelişmiş ülkelerde hem de gelişmekte olan piyasalarda küresel emsaller için kompozisyon değişiklikleri hakkında kapsamlı bir literatür taraması sağlamayı amaçlamaktadır. Endeks değişimlerinde rol oynayan olguya ışık tutarak, literatürün köklerinden başlayarak konunun mevcut durumunu yansıtan günümüz çalışmalarına kadar bir genel bakış sunulmaya çalışılmıştır ve literratürün ileride neleri kapsayabileceği anlatılmıştır. Çalışmamızın konusu, endekslere dahil edilme ve çıkarılma ile ilişkili bilgi etkileri, likidite üzerindeki etkileri, fiyat baskısı ve talep eğrisi kaymaları ile sonuçlanan talep şokları ve hisse senetlerinin talep eğrisi eğimleri etrafında odaklanmaktadır. Dünya genelinde endeks kompozisyon değişimlerinin enformasyon ve/veya talep kökenli açıklamalara dayanıp dayanmadığını incelenmektedir.

Anahtar Sözcükler: fiyat baskısı, bilgi etkisi, anormal getiriler, yatırımcı farkındalığı, likidite, gölge maliyetler

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LIST OF ACRONYMS AND ABBREVIATIONS

BIST100	Borsa Istanbul 100 Index
CSP	Corporate Social Practices
CSI	China Securities Index
DJSI STOXX	The Dow Jones STOXX Sustainability Index
DJSI World	Dow Jones Sustainability™ World Index
EPS	Earnings Per Share
ESG	Environmental And Social Governance
ETF	Exchange-Traded Fund
FTSE	Financial Times Stock Exchange 100 Index
IPO	Initial Public Offering
IRH	Investor Recognition Hypothesis
PPH	Price Pressure Hypothesis
REIT	Real Estate Investment Trust
Russell 2000	Russell 2000 Index
S&P 500	Standards and Poor's 500 Index

1. INTRODUCTION

Index additions/deletions of common equities into popular indexes, characterized as benchmarks by practitioners, have been a central part of the literature orientated around financial markets and the surrounding microcosms of index composition changes. Starting out with the S&P 500 index, a market-capitalization-weighted index of the leading 500 companies within the United States, there have been numerous analyses on the aforementioned topic and over time the literature has branched out to other developed markets in Europe and eventually we have started seeing literature examples focusing on emerging market indexes and most recently with the rise of thematic indexes such as ESG based indexes, we see the literature shifting towards composition changes for these thematic indexes. The specifically of the research on index changes is rather vast among the leading pieces in the sub-segment of Finance. There are pieces focusing on liquidity effects associated index changes, analyst ratings for added/deleted equities and how they play out over several time intervals, whether or not the index change itself is an information free event and its implications on stock demand, index change implications for thematic indexes such as ESG or Sharia, pure studies on price movements of newly added/deleted equities in relation the benchmark indexes, and many more. This paper will try to group these theories into generalized groups because in essence a certain part of these pieces are derivatives of pre-existing schools of thoughts and ultimately branched out over time. For example; information effects are directly related to investor awareness changes rooted in index composition changes.

Firstly, we will examine the information hypothesis, which illuminates if the addition or deletion in itself is an information event that can affect the investor decision making process. Studies in this area test for whether if the addition or deletion is an information free event or not. This is done mainly by setting up a market model and/or event study with event windows prior and after index composition change announcements. As equities are added to a benchmark index investment awareness increases as investors view

the addition of the equity as a signal of financial viability, considering that a generally a committee decides on the addition to the index. Following an addition or deletion to the relevant index, investors and analyst start to cover the operational performance and financial well-being of the company in more detail. The information regarding the firm becomes more available. As a result, the liquidity of the firm increases while the bid-ask spread becomes thinner; resulting with a more liquid common stock. The investor awareness theory is a derivative of this phenomenon and both are intertwined in nature and has roots in the information hypothesis (Scholes 1972; Boudoukh et al. 1993). There is also an alternative liquidity hypothesis which suggests that when a stock is included in an index, it experiences an increase in liquidity because the index change transmits information about the stock. This increase in liquidity is accompanied by a decrease in information asymmetry and a decrease in expected returns. As a result, the stock may experience a price jump due to the increase in liquidity. This hypothesis is based on the idea that investors value stocks with higher liquidity, as they are easier to trade and may be less risky. However, this hypothesis is not universally accepted, and further research is needed to confirm its validity. Additionally, in short- and long-term windows the bid-ask spread and ultimately liquidity effects associated can vary.

Secondly is the price pressure hypothesis; Index managers are responsible for tracking a relative index by keeping up with index change announcements. Insinuating that the goal for index trackers is to minimize tracking error to the index at hand, thus when there is an index change announcement index managers update their portfolio compositions to better reflect the new index make-up. The re-balancing behavior of index managers and other market participants en masse make up the essence of the price pressure hypothesis, initially introduced by Scholes (1972) in the early 1970's is one of the primary explanations for price changes occurring during index addition scenarios. Simply put, PPH is essentially a temporary increase in stock prices following an index inclusion announcement, the converse is also applicable (Gruber 1971; Michaely and Roberts 1995). Albeit the general picture can vary if the index at hand is thematic, due to

expectations varying for ESG themed indexes, also noteworthy, we can see considerable selling volume for sharia index deletions.

Lastly, the literature is heavy on the downward sloping demand curve of stocks amidst index composition changes. Particularly, the index change announcement is in itself an interesting inquiry in regards to demand shocks in financial markets. Earlier on Scheifer (1986) examined the slope of the demand curve of equities added to the S&P 500 index and found evidence in favor of permanent price increases for added companies; ultimately that S&P 500 inclusion results with an increased demand for the stock as measured with increase in volume and that equities have downward sloping demand curves (Fama and French 1993; Merton 1987).

All three main arguments in the field are intertwined in nature thus feed of one another over time as the literature has become more complex. We will be aiming to breakdown the topic in these four main arguments and also seek to provide gaps of actionable areas of the field that could help forward the literature. By doing so, we are aiming to give an extensive breakdown of the literature at hand. As you progress through our work you will get a grasp of how the same scientific framework applied at different indexes at different country levels will bring forth different answers to the same forms of questioning. This in itself is a reason for our inquiry into this specific sub-segment of the field as a study in the United States with the same questioning gives forth different answers for an emerging market country such as Malaysia and others. Looking at similar studies at different countries will show us the complexity of financial markets and how they can differ from one another on the country level. Another parameter that effects variances of results among countries can be attributed to the way index composition changes are conducted; some emerging market and eastern Asian indexes do not need to net exits and entries to the index hence that differs with developed market indexes such as the S&P 500. Certain indexes provide their criteria publicly and can choose to use aspects such as liquidity, market capitalization, certain amount of free float of shares and many other parameters

that do not necessarily provide informational content for investors; and in return it gives more negative results for information event testing inquiries.

Criteria to be included in the screening to be added on an index, companies generally need to fulfill certain criteria. As expected, market size is a factor while also a certain time has to have past the IPO, has to be liquid enough with enough shares and also profitability is also an important scale.

Some preliminary analyses figures from our local market, we can see that the BIST100 Index from the year of 2020 to 2022-end averaged 35.7 index additions (107 total) were made in a single fiscal year, likewise for index deletions as changes in the index are matched to maintain a specific figures. The maximum amount of index composition changes in the three years of inquiry was 2021 with 45 index composition changes, and the minimum amount was 22 changes in 2020. Details can be found below in Table 1.1.

Table 1.1: Summary of Additions and Deletions Amounts in BIST100

BORSA ISTANBUL					
Additions			Deletions		
2020	*2021*	*2022*	*2020*	*2021*	*2022*
22	45	35	22	45	35
Source: Bloomberg, Rasyonet					

On average the 3-day average intraday return vs the BIST100 index was -0.48% for all composition changes in the index. Neither addition or deletions could outperform the relevant index in the time interval of questioning as both underperformed Borsa Istanbul 100 Index; -0.56% and -0.49% respectively. Other relevant summary statistics can be found below, notably deletions saw higher deviation compared to additions. Details for the 3-day time horizon can be found in Table 1.2.

Table 1.2: Summary Statistics of Index Changes

All Changes					
3 Day Average Daily Return	Relative Return (vs.BIST100)	Maximum	Minimum	Median	Standard Deviation
3,89%	*-0,48%*	*50,18%*	*-16,45%*	*0,02%*	11,28%
Additions					
3 Day Average Daily Return	Relative Return (vs.BIST100)	Maximum	Minimum	Median	Standard Deviation
2,42%	*-0,56%*	*50,18%*	*-16,45%*	*0,01%*	9,00%
Deletions					
3 Day Average Daily Return	Relative Return (vs.BIST100)	Maximum	Minimum	Median	Standard Deviation
3,98%	*-0,49%*	*49,10%*	*-7,53%*	*0,02%*	11,39%

Source: Bloomberg, Rasyonet

Some preliminary figures from our local equity market are reflective of the general state of index composition changes. We can see that the 3-day average intraday return could not manage to beat the index at hand. It is a fascinating discussion to observe some other emerging market countries in our literature survey and be able to compare the Turkish equity realm with others.

2. LITERATURE REVIEW

2.1 Information Hypothesis

The addition to an index that is widely regarded as a benchmark has implications for the behavioral aspect of financial markets. An addition of an equity within a benchmark index can be studied to ascertain if the addition itself results with abnormal returns. Inclusion into a benchmark index can reflect on the state of the firm's financials, longevity of business operation, and prospects. Meaning; the inclusion to an index can illuminate a sense of prospering financials for the firm at hand in the eyes of investors. The information effect has been tested by multiple academicians in the field and the results can vary depending on the index of reference, methodology, and local regulations.

The information hypothesis is one possible explanation for the price changes that can occur when a security is included in an index. An event study is a useful tool for analyzing the price response of a security to a specific event, such as index inclusion, and can provide evidence for or against the information hypothesis. It's also important to consider other factors that can affect the price of a given security, such as market trends and investor sentiment. This is because the price changes that occur when a security is included in an index may not necessarily be due solely to the new information provided by the inclusion. Inclusions into the S&P 500 Index have been the most frequently analyzed and studies orientated around the index inclusion in relation with the earnings forecasts and realized earnings prior and after index change announcements indicated that the index inclusion is not an information free event (Denis et al. 2003). The index inclusion also results with higher scrutiny by analysts regarding financials, also firms are expected to make more informed and effective business decisions. Monitoring of the firm increases with the index inclusion, this is followed by increased investor awareness; abnormal returns are not symmetric when comparing inclusions and exclusions as in exclusions investor awareness' does not necessarily diminish (Cheng et al. 2004). A rather contrary study, compared to alike studies, conducted for the Malaysian market insinuated that the index additions carry negative impacts in comparison to index deletions; moreover, the reasoning for investor reactions to the announcements were

noted as psychological effects and investor behavior was deemed irrational (Ming et al. 2019). Common stock liquidity increases in scenarios of index additions in the U.S market and newly added index firms have a positive relationship with higher capex and R&D spending (Becker et al. 2006). Studies on index inclusion effects on stock prices in a large sample study for the Indian stock market Nifty showed that the index addition resulted with abnormal returns on the inclusion date, the abnormal returns for the event windows showed that portfolio restructuring on index funds accounted for the significant abnormal returns (Maheshwari 2015). The information effect is present in developed markets such as the U.S, albeit in emerging markets such as Malaysia, we can also observe both the information effect and PPH in addition scenarios for Sharia-compliant indexes. (Zainun 2016). Addition to a relevant index whether thematic or market-tracking associated, brings for also higher liquidity as institutional investors pay closer attention to the underlying operating performance and financial health of the company. At the same time, analyst coverage of the idiosyncratic stock increases with the index addition.

There have been studies that focus on the relationship between index additions and analyst EPS forecasts as well, additionally these types of studies are useful for grasping analyses surrounding information-free events in relation to index. A specific study also compared forecast accuracy among local and foreign analyst and concluded that foreign analysts hold a higher edge compared to their local counterparts, as foreign analysts are a part of more resourceful and sophisticated institutions. The authors find that due to addition to the index, there is no statistically visible information effect present (Tu and Chang 2012).

Another reasonality for short-term price changes following additions can be explained with the shadow cost view, initially introduced and coined by Merton's (1987) paper. Our awareness as investors for an idiosyncratic equity relies on our investor awareness and as a result affects the degree of diversification we seek. Investors expect a price premium referred to as shadow cost for the nonsystematic risk that they bear for the sub-optimally diversified portfolios they hold. The investor recognition hypothesis (IRH) is a theory proposed by Merton that suggests that index inclusion is associated with an increase in investor awareness and a decrease in the shadow cost of a stock. The IRH posits that when a stock is added to an index, more investors become aware of the stock and hold it for its

diversification benefits. This increased awareness leads to a decrease in the shadow cost, which is the difference between the price of a stock and its intrinsic value, and results in a permanent increase in the stock's price. This hypothesis does not require symmetric price reactions, as index deletions would not necessarily mean that investors become unaware of the stock. Therefore, observed asymmetric price reactions are consistent with the IRH.

When an equity is added to a relevant market representing index, the nonsystematic risk falls as the required rate of return falls. Looking at index additions in the S&P 500 index over 5 years prior to and 5 years after window, (Chan et al. 2013) finds that shadow cost for additions to the index decrease significantly. This is due to the investor awareness of added stocks increasing over time. Chan also finds that price effects of index additions are not simply caused by changes in short-term demand but rather due to implications of changes in analyst coverage and improvements in operations due to higher scrutiny. In a developed market setting of Malaysia, Shariah benchmark index composition changes were researched and the implications showed that deletions from the index can cause negative price responses in the short-term along with no significant price response for additions; this was rationalized as investor awareness by Sharia-compliant investors increasing for additions and index managers for the sharia orientated funds having to strictly exit positions in companies that are categorized as non-Sharia compliant by the decision maker. This results in significant selling pressure in the near-term by index managers but investor awareness for companies removed from the Sharia-compliant status does not result with a decline in investor awareness (Kassim et al. 2017). Another form of thematic indexes that are fascinating to look at are ESG themed indexes that are benchmarks, within the German stock market it was found that inclusion into ESG index funds such as DJSI STOXX and DJSI World result with negative price effects as financial markets punish the inclusion. The reason relies on the fact that market participants consider ESG inclusions as a signal of future or ongoing cost activities that are rather unproductive along with compliance to institutional pressures. (Oberndorfer et al. 2011). This points us to the fact that not all index inclusions result with price appreciation and that the relationship is not positively related; we see that index type is an important factor overarching index composition change direction. Put another way; the information

hypothesis might not hold in thematic index changes as there is not a symmetric price response on both additions and exclusions; assuming the view point that information hypothesis holds when price reaction on both additions and deletions are symmetric.

Vilas and Sarto (2021) look at inclusions and exclusions criteria for general market and sustainability indexes, more specifically the criteria in which effects the selection process. They found that among the factors of selection, size of the company attributed more to the index inclusion/inclusion than the sustainability factor for the firm; hence a sustainable company might not always be included to a thematic index. The question that circulated following this paper is that if size is such a large criterion for inclusion into sustainability indexes; why does the need to have thematic sustainability indexes in the first place? Furthermore, they note that CSP practices are more definitive in inclusions rather than in exclusions and size has more of a say in exclusions for ESG orientated funds in the FTSE respectively. Environmental and social governance policies at publicly traded companies might not always result with improved stock returns, rather they might result in self-interest serving behaviors of corporate executives as they direct corporate giving's to areas that serve well for the independent directors of the board; all being said self-interest serving corporate giving can reduce firm value (Masulis and Reza 2015). On the other side of the argument, the impact of corporate social responsibility activities is dependent on the state in which these activities are advertised to investors and alike, CSR can positively affect firm value if there is awareness by customers of the firm. If these conditions are set then sustainability efforts can positively affect firm value, while also noting the impact of customer awareness with respect to corporate visibility. (Servaes and Tomayo 2013).

Looking at the DJ Sustainability Index through 2005 to 2016, Kang (2021) finds that abnormal returns can be achieved following one year after sustainability index listing which is in support of the informational hypothesis while this is primarily based in institutional demand for sustainability awareness; additionally the authors do not find any significant change in short interest for the listed or delisted stock at hand, indicating that investors are not trying to arbitrage price imperfections for the respective index and

effectively we can observe that abnormal returns based on index composition changes in sustainability indexes can be achieved in the long term for the DJSI.

Another study (Cai and Houge 2008) found that by looking at Russell 2000 small cap ETF for the 1979-to-2004-time horizon, we see the interesting impact of rebalancing behavior of small cap companies. As companies are added to the index and overtime go over the threshold of being considered a small cap, resulting with better performance for index deletions in small caps. The authors also find that a buy and hold portfolio at time horizon inception for the sample outperformed the rebalanced portfolio of the small cap fund; factor adjusted returns for funds that hold index deletions rather than mimic the behavior was also superior to the index in the same time horizon. Simply put; an exit from the Russell 2000 small cap ETF can mean that the firm is considered as a mid-cap equity hence the exit from the ETF can insinuate a growth prospectus ahead for the firm at hand.

Index composition change criteria for the S&P 500 include non-transparent parameters and could convey non-public information. On the contrary, a benchmark Chinese index titled CSI 300 has a clear-cut approach with unlimited spots for additions or deletions, meaning that the excluded and included common stocks do not need to net each other out. Liquidity and market capitalization are the premier drivers of index constitution selection; ergo Chen and Lin argue that the asymmetric effects of index re-compositions can be attributed to increased investor awareness and additionally, newly included components have improved operational efficiency following the addition along with raising higher amounts of capital from investors in the interim (Chen and Lin 2016). A rather interesting study conducted for the Hang Seng Index in Hong Kong focused on the long-term implications of index composition changes. Similar to the CSI 300, the Hang Seng Index does not need to net inclusions with exclusions. The interesting aspect of this study is that deletions from the respective index pose abnormal returns in a five-year long horizon. Moreover, the operating performance of deleted firms improve following the deletion and ultimately outperform those that were added to the index; the authors show that this unusual phenomenon is rooted in the Chinese state-owned companies that show poor performance (Kot et al. 2015). There are also sector specific research pieces such as one that focuses on index changes for REIT indexes. The REIT sector is considered as a stable

sector with comparably predictable cash flows and ultimately is considered as informationally efficient. The authors find that REIT index changes contain higher informational efficiency compared to non-REIT indexes, particularly in the long-term horizon. (V. Sah et al. 2014).

Another parameter at play for the S&P 500 index composition changes is the nature of the index change announcement. Specifically, the S&P 500 started to pre-announce index changes in 1989. The index planning is conducted by the S&P US indexes committee. Ivanov found that pre-1989 excess returns in the S&P 500 following index changes carried a white nose effect while after 1989 excess returns were present (Ivanov 2013). This methodology that divides time horizons for studies as pre and post 1989 show that the way in which index composition changes are conducted, in this case pre-announced or notice can give implications for the hypotheses tested.

Opening a side note for behavioral finance related aspects of the discussion, we can observe that simply put, Behavioral biases carried refer to systematic errors in judgment that arise from psychological and emotional factors. Investors are also lenient towards this kind of behavior and these biases can impact the investor decision making process (Barber and Odean 2001). Inclusion into an index can signal prospering financials and investors ultimately overestimate this phenomenon, which is a great example of representative biases carried in investment decision making. (Thaler 1985).

2.2 Price Pressure Hypothesis

Index inclusion refers to the process of adding a security to a financial index that is representative of a group of equities, which is a collection of securities that represents a particular market, sector or size. The inclusion of a security in an index can have various implications on its performance and price. The hypothesis at hand is the price pressure hypothesis, which suggests that the inclusion of a security in an index can lead to increased demand for that security, potentially causing its price to rise. This is because many investors and fund managers track financial indexes and may adjust their portfolios to match the composition of the index. As a result, the inclusion of a security in an index

can lead to increased buying of that security, which can drive up its price. The main posit in the price pressure argument is if its short lived or not and also the degree of impact reflected as abnormal returns in event windows that could be made up through 15 days prior to 5 days after; announcement date compound annual returns are particularly spotlighted.

Index managers are financial professionals that are responsible for mimicking a certain benchmark within their financial product offerings to serve investors with instruments that track a certain market segment, sector, investment theme and many more. Hence index managers are responsible for tracking a relative index by keeping up with index change announcements. Insinuating that the goal for index trackers is to minimize tracking error to the index at hand, thus when there is an index change announcement index managers update their portfolio compositions to better reflect the new index make-up. The re-balancing behavior of index managers and other market participants en masse make up the essence of the price pressure hypothesis. Simply put, PPH is essentially a temporary increase in stock prices following an index inclusion announcement, the converse is also applicable. Ultimately, we observe testing for PPH in the short-term horizon windows rather than long term due to the nature of the hypothesis.

Another dimension of the index inclusion argument can be found among the linkage between corporate sustainability and firm performance. There are indexes that track and act as a representative of corporate responsibility, and similarly to arguments in sharia compliant indexes, this thematic outlook aims to find a linkage between firm performance and corporate sustainability. A study focusing on Dow Jones Sustainability Index Europe from 2009 to 2013 found no direct evidence of index changes to have permanent price effects, rather the results showed that the price changes were temporary, the study showed support for the price pressure hypothesis (Sketelenburg et al. 2015). Component changes in the S&P 500 index have a large and partially temporary price effects on included stocks, if these index additions by any chance were included in small and mid-cap funds priorly the price effects of the inclusions become significantly smaller (Green and Jame 2011). Investors demand a premium for the risk they bare within their portfolios along with the transaction costs associated. Harris and Gurel noted that if information seeking

investors were highly motivated to receive information prior to the subscription service of index changes in 1976, these information seeking investors would try to receive data as they could inquire with the S&P considering the information was available per request. Prior to the subscription service and after, index managers were the ones that inquired regarding the index change. They found after 1976, mean announcement price changes increased significantly while priorly the price changes were miniscule and this implies inconsistency with the information hypothesis (Harris and Gurel 1986). Following their study on price effects and volume associated with the S&P 500 Index they came out in favor of the price pressure outlook over the ladder. In a closer time horizon between 1996 and 2002 Madhavan analyzes the Russell 2000 index, which is solely constructed per market capitalization and other liquidity measures on a yearly schedule. Madhavan shows that the common stocks that were subjected to Russell 2000 index reconstitution provided equity returns large in magnitude compared to S&P 500 index revisions in the short-term and these equity returns were largely rooted to temporary price pressure with some influence given to permanent changes in liquidity (Madhavan 2003). Intellectually, this could also be partially explained with Russell 2000 being representative with smaller firms with respect to size, intuitively as a practitioner in the field, smaller firms tend to outperform larger counterparts such as equities in the S&P 500 index.

We observed a study focused on benchmark indexes of France and England found evidence in favor of the PPH over information effect and linked phenomena. The study finds that price effects are short lived and demand curves of stocks looked at shift to previous levels after announcement periods of the so-called changes; markets adjust to index changes slower than the theories predicated (Vespro 2006).

2.3 Downward Sloping Demand Curves for Stocks

A downward sloping demand curve in index additions and deletions reflects the inverse relationship between the price of a security and the demand for it to be included or excluded from an index. The downward sloping demand curve is used to visualize how the demand for a security to be added or removed from an index changes as its price fluctuates. Within the Modigliani- Miller Theorem an assumption was that the demand

curve of the firm's equity was horizontal, initially academics started out with looking at large block trades before index inclusion scenarios to test this assumption. Later on, we observe that the assumption of horizontal demand curves for stocks was flawed when testing for index announcement scenarios because if demand curves were indeed horizontal, price increases should not occur following index inclusions. Shleifer found that in contrary to the horizontal demand curve assumption, equity prices for the S&P 500 did significantly increase following announcements of the inclusions, implying that demand curves of stocks slope downward (Shleifer 1986). He also brings about how abnormal returns from stock inclusions increased from 1976 - 1983 in the S&P 500 index in parallel with the growth of index funds at the time; prior to 1976 the S&P would publish the Cumulative Index to Standard and Poor's Outlook on a monthly basis and would not provide a date regarding when the new member was added. This paper is highly significant for this sub-segment of the financial markets field insofar that we also started to understand and quantitatively measure the relationship between volume and returns. Also, the information hypothesis was used to rationalize the notion that index inclusion in the S&P 500 was a token of quality prospects for newly included firms. Moreover, slope of demand curves being downward is essentially a result of stocks having close substitutes (Elliot et al. 2006). Lynch and Mendenhall found support for downward sloping demand curves while looking at the issue in conjunction with the Efficient Market hypothesis. Moreover, they showed that via publicly available information a market participant could earn positive abnormal returns with a trading outlook based on index composition changes; this violates assumptions in favor of semi-strong form market efficiency (Lynch and Mendelhall 1995). In general, we can observe within the literature that the abnormal returns caused by index composition changes are not consistent with semi-form efficiency in financial markets.

On the liquidity front of things, focused on index deletions with grouping of pre and post 2000, a study found that bid-ask spreads of non-optioned index deletions increased insignificantly. Moreover, negative abnormal returns in the post-2000 group saw faster recovery compared to the pre-2000 group; directing us to the thought that this could be due to decreased information asymmetry in financial markets following 2000 considering that this year saw major changes in the regulatory landscape that the S&P 500 (Kamal

2014). We can rationalize the post-2000 group having faster recovery to regulatory measures added by policy makers following the collapse of the dot-com bubble.

Another dimension in the argument for index changes is the role Exchange Traded Funds play in financial markets, as they have risen in popularity. ETFS's basically mirror the performance and composition of a relevant index based on either market cap, sector, size, investment theme or other parameters. Blume and Keim indicate that from 1980 to 2008, institutions favored small caps over large caps; considering bid-ask spreads of small caps improved which shows better liquidity conditions within the experimental space. (Blume and Keim 2011) Furthermore on the ETF literature; a study found that ETF inclusion for companies improve general liquidity but also increase short interest as result, therefore have negative consequences for firm value; this finding was more visible for small cap firms particularly (Bae and Kang 2012). It is also observed that S&P500 index inclusion effect is mainly driven by liquidity needs of index funds at hand over changes in investor sentiment (Elliot et al. 2007)

With the basic notion that the Efficient Market Hypothesis makes up the building blocks of neoclassical financial theory, EMH describes that current prices of securities fully reflect the information publicly available and ultimately reflect on fair value of stocks (Liu et al. 2022). The dominant outlook in the literature of index inclusions focus on either liquidity, abnormal returns and/or parameters alike. A distinct study looks at the co-movement of stocks in the S&P 500 and reflects on the fact that when an index change occurs, the category of the stock at hand changes as the underlying fundamentals of the company largely stay the same. Here we observe that newly index-included firms show co-movement with index companions and at a less of a degree of co-movement for non-index participant counterparts, the opposites apply for index exclusions (Barberis et al. 2002).

A study focused on the long-term state of demand curves for stocks suggested that after looking at Chinese Split-Share structure reform effected share premiums of different classes of shares, A share float increase leads to larger decreases in share premia which in return leads us to the thought that stocks slope down in the long run. (Liu and Wang

2021) While also noting that increases in A-share floats leads to reduced turnover and volatility of returns.

3. CONCLUSION

As we have seen, the inclusion or exclusion of a security in a financial index can have various impacts on its performance and price. The price pressure, information, and the downward sloping demand curves are three possible explanations for these impacts. Additionally, market sentiment and other factors, such as broader market trends, can also affect the prices of securities that subjected to index inclusions (or exclusions). Researchers can use event studies to analyze the price response of securities to index inclusions and provide evidence for or against these hypotheses. One important aspect of index composition changes is the relationship between the price of an asset and its demand as an addition to or deletion from an index. In general, a downward-sloping demand curve can be observed in index additions and deletions, indicating that as the price of an asset increases, the demand for that asset as an addition to an index or as a deletion from an index decreases. This relationship exists because investors will be less likely to want to buy an asset that has a high price, and therefore less likely to want that asset to be included in an index. Similarly, investors may be more likely to want to sell an asset that has a high price, and therefore more likely to want that asset to be deleted from an index.

In conclusion, index inclusions and exclusions are an important aspect of the financial markets, and the impacts of these events can be complex and multifaceted. By considering the various factors that can affect the prices of securities in index inclusions and exclusions, and by using tools like event studies, researchers can gain a better understanding of the dynamics of these events and their effects on the market. In general, index inclusion/exclusion refers to the process of adding or removing certain securities from a financial index. This process can have a significant impact on the performance of the index and the companies included in it. For example, if a company is added to a popular index, it may see an increase in its stock price due to increased demand for its shares. On the other hand, if a company is removed from an index, it may see a decrease in its stock price. In the academic literature, there has been a lot of research on the effects of index inclusion/exclusion on the performance of companies and financial indices.

Some studies have found that being included in a popular index can have a positive impact on a company's performance, while others have found that the effects can be more complex and depend on various factors. In terms of implications for practitioners in financial markets, understanding the effects of index inclusion/exclusion can help investors make informed decisions about which companies to invest in. It can also help companies understand the potential impact of being included or excluded from an index on their stock price and overall performance. There are still many areas in the literature that could be further developed and investigated. For example, more research could be done on the long-term effects of index inclusion/exclusion on the performance of companies and financial indices, as well as on the specific factors that can influence these effects. Additionally, research could explore the potential impact of index inclusion/exclusion on different sectors or industries, and how this impact may vary across different markets. Based on the literature that we have reviewed we cannot fully ascertain a clear-cut view on index composition changes and its effect for financial markets. Although, we can indeed come to a series of indicative conclusions based off the extensive literature we have reviewed.

The literature in this field of financial economics has become rather vast as the global economy becomes more and more securitized. Information signaling in index inclusions and exclusions make up a large chunk of the literature that investigate whether the index composition changes in themselves result in improved operational performance results or at the very least prospects for improvement for the company. Based on the views of thematic index composition changes we can come to the conclusion that index type such as Sharia-compliant or ESG determine both the short- and long-term effects of stock prices within index changes. An exclusion from a Sharia-compliant index can cause significant selling-pressure as funds reflecting Sharia rooted investment outlooks will exit their positions in the firm at hand, irrespective of underlying financial performance.

In the case for index composition changes only having short-term momentum effects on the underlying equity, we can ascertain that it is most of the time explainable with the price pressure hypothesis. As index managers try to mimic the new composition structure of the index change, they display behavior in favor of minimizing tracking errors between

their funds at hand versus the reference index. Short-term abnormal returns orientated on index change announcements are achievable but short-lived according the price pressure hypothesis. We can ascertain that PPH is more reflective of short-term implications of index composition changes.

As there are changes in the regulatory environment, so does index inclusion/exclusion dynamics. An interesting inquiry in this field would be to look at index composition changes, particularly abnormal return and liquidity in order to ascertain the effect of COVID-19, one could simply have two sets of data split as pre and post COVID-19. This could reflect on the implications for index changes in conjunction with events that abruptly increase systematic risk such as the global pandemic. Such shocks for the financial system make the concept of event studies, which are highly utilized in this niche field of financial market literature, highly attractive in the concept of index composition changes. The results of a COVID-19 orientated event study in index change announcements will be highly interesting for financial markets as after the breakout of COVID-19 has brought a lot of retail traders and investors to financial markets around the world. Another important branch out in the literature is the abruptly increased volume of work on the sustainability and overall ESG thematic indexes. The ESG rooted work has brought out large implications regarding agency costs among shareholders and managers and how size plays an important role in index composition changes for sustainability orientated funds, and ultimately how it can have a higher influence in index composition changes than ESG related factors. Another interesting inquiry could be on rising behavioral finance phenomena such as behavioral biases that affect investor decision making. To my best knowledge, such a questioning in retrospect to the behavioral reasoning in financial markets has not been conducted yet. How investor behaviors effect index composition returns could also serve as a significant contribution to the literature in the field.

We see a general trend of researchers collecting data on the prices of securities that have been included in a financial index over a certain time period, as well as the prices of similar securities that have not been included in the index. The researcher tend to then use regression analysis and other statistical concepts and frameworks to compare the

price changes of the indexed securities to the price changes of the non-indexed securities, controlling for other factors that might affect the prices of both groups of securities; these inquiries tend to provide evidence for or against the price pressure hypothesis in index inclusions. The information hypothesis in index inclusions suggests that the inclusion of a security in a financial index provides new information about the security's performance and prospects, which can affect its price in return. To test this hypothesis, researchers use event study methodologies, which are statistical methods that analyzes the price response of a security to a specific event, for example index inclusions. A market model tends to be constructed to further scientific testing for studies at hand.

A gap in the literature that could be further examined is index change announcements of for technology sector-tracking indexes. Elaborating, tech sub-sectors as well have indexes and funds that track them. Main sub-sectors as of currently are cybersecurity, web3-rooted metaverse/cryptocurrency, and artificial intelligence funds. Examining index composition changes for these thematic investment indexes could convey substantial output for thematic indexes along with the aggregate state of index literature. Bearing in mind that we cannot fully have a understanding of thematic index composition changes until we study the majority of segment representative indexes. Also, comparing a sector with more easily forecastable cash flows such as storage or real estate with technology, which historically has been complicated with respect to estimating future cash flows, could be fruitful in comparing sectors that have comparably visible cash flow generation variances among one another. Moreover, output of such a study could add another interesting layer to the literature at hand. Over time as more and more index funds emerge that track the sub-sectors of the technology, we will have a healthier data set that we can draw conclusions from, albeit as of current the data for these aforementioned technology sub-segments are limited.

The literature could broaden into emerging market indexes as the work on that side is limited in nature. Elaborate studies exist that look at S&P 500 and FTSE benchmark and thematic indexes, the scope of analysis could basically replicate itself into emerging markets so that we can see the causational relationship observed in developed markets. By doing so, we can improve our understanding of how emerging markets operate

compared to developed ones. Keeping in mind that our understanding of index composition changes cannot be fully set-up unless we start looking at thematic index composition changes in the context of countries such as South Africa, Argentina and alike which have microstructure issues and problematic data reliability compared to developed counterparts. If we were too group companies subjected to index composition changes by predictability of free cash flow generation on a spectrum, on one hand we would have storage and REITS and on the other technology companies. Comparing the edges of the spectrum could provide valuable insight into the relationship of free cash flow variance and index inclusions and exclusions.

The downward sloping demand curve and price pressure hypotheses are intertwined in nature. Based on our literature reference points both argue that price reactions to index composition changes ought to be symmetrical and that demand curves for stocks are downward sloping in the long-run and are nearly or fully horizontal in the long run. Hence the generalized outlook in this field is not necessarily black and white but rather the overarching theories altogether provide the larger picture for index inclusions and exclusions. The information hypothesis and related liquidity explanations for index additions and deletions can be characterized as information rooted explanations for the phenomenon at hand which effectively implies the events are information-based. While on the other hand, price pressure and downward sloping demand curve explanations in the literature are rooted in, but not completely limited to, changes in short term demand for securities subjected to index composition changes.

To our best knowledge, this paper is significant due to the fact that it takes into account index composition changes around the world and shows how outputs of research questions can vary depending on geography, state of development, size, theme, and other factors. We look at figures across the world while also carrying a rather large block of various index types. We have not seen a quasi-comparison or anything related to that form in a survey manner that takes into account global indexes at this extent. Asymmetric effects of index composition changes, particularly historically volatile emerging market indexes are also an area for discussion with lots of prospects of inquiry.

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