

**ISTANBUL TECHNICAL UNIVERSITY ★ GRADUATE SCHOOL OF ARTS AND
SOCIAL SCIENCES**

**PREDICTING STOCK RETURNS WITH MACROECONOMIC INDICATORS
& GOOGLE SVI & NEWS SENTIMENT**

MSC. THESIS

Zekeriya BİLDİK

Department of Business Administration

Master of Business Administration with Thesis

JULY 2020

**ISTANBUL TECHNICAL UNIVERSITY ★ GRADUATE SCHOOL OF ARTS AND
SOCIAL SCIENCES**

**PREDICTING STOCK RETURNS WITH MACROECONOMIC INDICATORS
& GOOGLE SVI & NEWS SENTIMENT**

MSC. THESIS

**Zekeriya Bildik
(403181021)**

Department of Business Administration

Master of Business Administration with Thesis

Thesis Advisor: Prof. Dr. Oktay TAŞ

JULY 2020

İSTANBUL TEKNİK ÜNİVERSİTESİ ★ SOSYAL BİLİMLER ENSTİTÜSÜ

**MAKROEKONOMİK GÖSTERGELER & GOOGLE ARAMA ENDEKSİ &
HABER DUYARLILIĞI İLE HİSSE SENEDİ GETİRİ TAHMİNİ**

YÜKSEK LİSANS TEZİ

**Zekeriya Bildik
(403181021)**

İşletme

Tezli Yüksek Lisans

Tez Danışmanı: Prof. Dr. Oktay TAŞ

TEMMUZ 2020

Zekeriya Bildik, a MSC. student of ITU Graduate School of Arts and Social Sciences student ID 403181021, successfully defended the thesis/dissertation entitled “PREDICTING STOCK RETURNS WITH MACROECONOMIC INDICATORS & GOOGLE SVI & NEWS SENTIMENT”, which he prepared after fulfilling the requirements specified in the associated legislations, before the jury whose signatures are below.

Thesis Advisor : **Prof. Dr. Oktay TAŞ**

Istanbul Technical University

Jury Members : **Assoc. Prof. Dr. Cumhuri Ekinci**

Istanbul Technical University

Prof. Dr. Suat Teker

Isik University

Date of Submission : 15 June 2020

Date of Defense : 21 July 2020





To my spouse and upcoming children,



FOREWORD

I gratefully thank to my supervisor Prof. Dr. Oktay Taş for his guidance, support and encouragement from the brainstorming phases through final issue. I would like to express my gratitude to the members of the thesis monitoring committee Assoc. Prof. Dr. Cumhuri Ekinci, Prof. Dr. Suat Teker and Prof. Dr. Cengiz Kahraman for their expertise and recommendations.

I would like to thank my precious wife, support, inspiration and encouragement throughout my life. I sincerely would like to thank my mother and my father for sacrificing anything for my education along their lives. This is absolutely precious. It is getting more familiar when closing to have a children. Appreciating my elder brother enabled me to get bachelor degree as paying my living expenses at my undergraduate years. Thanks to my extended family with mother in law, father in law and brother in law for their precious supports.

JUNE 2020

Zekeriya BİLDİK



| TABLE OF CONTENTS | <u>Page</u> |
|--|--------------------|
| FOREWORD | ix |
| TABLE OF CONTENTS | xi |
| ABBREVIATIONS | xiii |
| LIST OF TABLES | xv |
| LIST OF FIGURES | xvii |
| SUMMARY | xix |
| ÖZET | xxiii |
| 1. INTRODUCTION | 1 |
| 2. LITERATURE REVIEW AND HYPOTHESIS | 7 |
| 2.1 Traditional Finance Concept | 7 |
| 2.1.1 Gut feeling and present value analysis | 8 |
| 2.1.2 Capital asset pricing model and arbitrage pricing model | 13 |
| 2.2 Modern Finance Concepts | 13 |
| 2.2.1. Macroeconomic indicators | 14 |
| 2.2.2. Behavioral finance | 17 |
| 2.2.2.1 Investor attention | 21 |
| 2.2.2.2 Investor sentiment..... | 23 |
| 2.3 Research Questions | 26 |
| 3. DATA AND METHODOLOGY | 29 |
| 3.1 Predicting Stock Returns on Borsa Istanbul Index with Macroeconomic Indicators | 29 |
| 3.1.1 BIST 100 total..... | 36 |
| 3.1.2 BIST 100 service | 39 |
| 3.1.3 BIST 100 financial..... | 40 |
| 3.1.4 BIST 100 industrial | 40 |
| 3.1.5 BIST 100 technology..... | 41 |
| 3.2 Predicting Stock Returns on Borsa Istanbul Index with Macroeconomic Indicators and Google SVI | 44 |
| 3.2.1 BIST 100 total..... | 46 |
| 3.2.2 BIST 100 service | 49 |
| 3.2.3 BIST 100 financial..... | 51 |
| 3.2.4 BIST 100 industrial | 53 |
| 3.2.5 BIST 100 technology..... | 55 |
| 3.3 Predicting Stock Returns on Borsa Istanbul Index with Macroeconomic Indicators & Google SVI & News Sentiment | 57 |
| 3.3.1 BIST 100 total..... | 57 |
| 3.3.2 BIST 100 service | 60 |
| 3.3.3 BIST 100 financial..... | 62 |
| 3.3.4 BIST 100 industrial | 64 |

| | |
|---|----|
| 3.3.5 BIST 100 technology | 66 |
| 4. RESULTS | 69 |
| 4.1 Effects of Macroeconomic Indicators on Stock Returns at Borsa Istanbul..... | 69 |
| 4.2 Effects of Macroeconomic Indicators & Google SVI on Stock Returns at Borsa Istanbul | 71 |
| 4.3 Effects of Macroeconomic Indicators & Google SVI & News Sentiment on Stock Returns at Borsa Istanbul..... | 72 |
| 5. CONCLUSION | 75 |
| 5.1 Further Discussions | 78 |
| REFERENCES | 79 |
| CURRICULUM VITAE | 85 |

ABBREVIATIONS

| | |
|----------------------------|--|
| ASVI | : Abnormal Search Volume Index |
| APT | : Arbitrage Pricing Theory |
| BIST 100 Total | : Istanbul Stock Exchange 100 index |
| BIST 100 Service | : Istanbul Stock Exchange Service 100 index |
| BIST 100 Financial | : Istanbul Stock Exchange Financial 100 index |
| BIST 100 Industrial | : Istanbul Stock Exchange Industrial 100 index |
| BIST 100 Technology | : Istanbul Stock Exchange Technology 100 index |
| BO | : Brent oil price USD |
| C | : Copper price USD |
| CAPM | : Capital Asset Pricing Model |
| CB | : Currency basket |
| CBFR | : Commercial banks funding rate |
| DJIA | : Dow Jones Industrial Average |
| EM | : Emerging markets |
| EMH | : Efficient Market Hypothesis |
| FDI | : Foreign direct investment |
| G | : Gold price USD |
| IPI | : Industrial Production Index |
| KSE | : Pakistan Stock Exchange |
| M2 | : M2 money supply |
| NS | : News sentiment |
| PPI | : Producer Price Index |
| S&P 500 | : S&P 500 Index |
| SVI | : Search Volume Index |
| EPS | : Earning per share |
| ROA | : Return on asset |
| ROE | : Return on equity |
| RQ | : Research question |
| BPS | : Book value per share |
| PB | : Price to book ratio |



LIST OF TABLES**Page**

| | |
|--|--------|
| Table 2.1 : Liquidation – straight line approach | 10 |
| Table 2.2 : Liquidation – going concern approach..... | 12 |
| Table 2.3 : Predictors of stock returns | 16 |
| Table 2.4 : Sicherman’ s hypothesis on investor attention..... | 22 |
| Table 3.1 : Time series denomination of independent variables..... | 33 |
| Table 3.2 : Time series denomination of dependent Variables | 33 |
| Table 3.3 : Macroeconomic indicators correlation table..... | 34 |
| Table 3.4 : BIST 100 total lag test result..... | 35 |
| Table 3.5 : BIST 100 total – commercial bank funding rate regression test..... | 37 |
| Table 3.6 : BIST 100 total – commercial bank funding rate regression test result..... | 37 |
| Table 3.7 : BIST 100 total – macroeconomic variables initial regression result | 38 |
| Table 3.8 : BIST 100 total – macroeconomic variables final regression result | 39 |
| Table 3.9 : BIST 100 – macroeconomic variables final regression table | 43 &70 |
| Table 3.10 : Relative weights of top ten stock of BIST 100 total | 44 |
| Table 3.11 : Relative weights of top ten stock of BIST 100 service..... | 45 |
| Table 3.12 : Relative weights of top ten stock of BIST 100 financial | 45 |
| Table 3.13 : Relative weights of top ten stock of BIST 100 industrial | 46 |
| Table 3.14 : Relative weights of top ten stock of BIST 100 technology | 46 |
| Table 3.15 : BIST 100 total – SVI regression result | 47 |
| Table 3.16 : Δ BIST 100 total SVI independent variable | 48 |
| Table 3.17 : BIST 100 service – SVI regression result..... | 49 |
| Table 3.18 : Δ BIST 100 service SVI independent variable | 50 |
| Table 3.19 : BIST 100 financial – SVI regression result | 51 |
| Table 3.20 : Δ BIST 100 financial SVI independent variable | 52 |
| Table 3.21 : BIST 100 industrial – SVI regression result | 53 |
| Table 3.22 : Δ BIST 100 industrial SVI independent variable | 54 |
| Table 3.23 : BIST 100 technology – SVI regression result | 55 |
| Table 3.24 : Δ BIST 100 technology SVI independent variable..... | 56 |
| Table 3.25 : BIST 100 total – News Sentiment regression result | 58 |
| Table 3.26 : Δ BIST 100 total NS independent variable..... | 59 |
| Table 3.27 : BIST 100 service – News Sentiment regression result..... | 60 |
| Table 3.28 : Δ BIST 100 service NS independent variable | 61 |
| Table 3.29 : BIST 100 financial – News Sentiment regression result | 62 |
| Table 3.30 : Δ BIST 100 financial NS independent variable..... | 63 |
| Table 3.31 : BIST 100 Industrial – News Sentiment regression result..... | 64 |
| Table 3.32 : Δ BIST 100 Industrial NS independent variable | 65 |
| Table 3.33 : BIST 100 Technology – News Sentiment regression result | 66 |
| Table 3.34 : Δ BIST 100 Technology NS independent variable..... | 67 |

Table 3.35 : BIST 100 – macroeconomic variables & google SVI & bloomberg news sentiment final regression table.....74



LIST OF FIGURES

Page

Figure 1.1: The relationship between macroeconomic variables, investor attention and investor sentiment.....28





PREDICTING STOCK RETURNS WITH MACROECONOMIC INDICATORS & GOOGLE SVI & NEWS SENTIMENT

SUMMARY

Along the history of humankind, predicting future is the key of success in any area of science and business. After assimilating through mentality fasting and future oriented, investment is getting more important for people. An environment has been formed that meets investors and entrepreneurs. Saving transform into investments and create momentum in the economic growth. In the early ages of traditional finance, investors are making evaluation according to expected cash flow even if they are not aware of the methodology that they applied. After introduction of risk factor to investment decision, CAPM, EMH and APT has been developed to be used in investment decision making. The underlying rational investor assumption of this theories make them vulnerable to explain all movements in stock markets. Biggest criticism through EMH is to assume all parties in the market has been informed at the same level and new information diffuse all parties at the same level instantly. As a result of this assumption, nobody in the market can make additional profit over the given output calculated over expected future price, discount rate and dividends. On the contrary one-way movement in the markets would be available and yield to collapse of financial system. Sense of data and evaluation changes according to many social, genetic and intellectual property that they accumulated in wisdom. It is absolute reality that all investors are not rational and could not make sensible decisions at any time. Even if there is one macroeconomic environment with same set of data for anyone, it makes differentiate person by person to capture and evaluation of it. Marginal satisfaction of investor from each unit of earning and marginal disfavor from each unit of loss depends on investor's sense of profit/loss, available prosperity and a few more objective & subjective factors too. All these hidden effects subject to behavioral finance. Cognitive process, is the basis of behavioral finance, is to rely on perceiving processing and evaluation of data and process decision making. Somehow described as gut feeling in older times, nowadays denominated as investor sentiment and investor attention is the one of the main driver of asset pricing. Investor decision is not depending on one hundred percent to mathematical formulation, especially when uncertainty and volatility is at stake. Basic instinct plays important role in that circumstances. In real life, many people prefer certain earnings to fair gambling and thereby expected value mentality cannot be applicable to real life. So, besides of risk aversion tendency, imprinting, random consistency, overconfidence, optimism and wishful thinking, representativeness are the main behaviors of investors applied in investor decisions that yields bubbles, price abnormalities beyond intrinsic values of them. Sometimes, these price movements stay longer time in action at irrational levels. Our methodology in the thesis developing a model includes behavioral finance indicators besides of macroeconomic indicators that give a way to stock market in the

middle term ranges. We contemplate that, macroeconomic and microeconomic indicators are the mainstay predictor of stocks that will realized regardless of short term fluctuation motivated with any factors. Macroeconomic indicators has the preliminary roles in predicting stock returns while microeconomic indicators like over-expected growth, operational profit, increase in market share, new merger & acquisition are eventual ones that gives overall performance of company after it realized. Macroeconomic variable sides, eight different macroeconomic indicators have been employed to analyze five different BIST 100 index in Turkey. To analyze microeconomic factors effects we employed investor attention via google SVI and investor sentiment via bloomberg news sentiment within underlying assumption that microeconomic variables effects on investors transform into action with investor attention and investor sentiment, in a combined way with behavioral finance.

Motivation of thesis is to provide a methodology to investors not only statistically significant but also economically beneficial, works in real life into investment strategies. In the first part of thesis producer price index, industrial production index, commercial banking funding rate, currency basket, gold price (ons), M2 money supply of TCB, Brent oil (USD), Copper (USD) has been taken into consideration as possible macroeconomic variables effects stock return at BIST 100 total, BIST 100 service, BIST 100 financial, BIST 100 industrial, BIST 100 technology index. Upon detail statistical analysis, we created regression formulas for each index, explains 12,20 % to 33,40 % variations on index returns at 95% significance level. In a small snapshot wise, results show that only five macroeconomic variables, industrial production index, commercial banks funding rate, currency basket, gold price, M2 money supply of TCB, have material and powerful effect on BIST 100 index returns at 95 % significance leve while producer price index, brent oil (USD) and copper (USD) price level change has no material and powerful effect on examined BIST 100 indexes at 95 % significance level. M2 money supply of Central Bank of Turkey , currency basket and gold price are the fastest reactor for BIST 100 index changes. That three macroeconomic indicator effects BIST 100 indexes as soon as they have been declared. Effects on industrial production index on BIST 100 indexes has been realized with at least two months' time lag. M2 money supply of Central Bank of Turkey and currency Basket changes have in negative way relationship with BIST 100 index returns while industrial production index, gold price and commercial bank funding rates have positive relationship with BIST 100 index returns.

In the second part of thesis, we employed investor attention via google SVI and created an investor attention independent variable (index SVI) based on top ten stock of each index regarding partial weight of these stocks in index. Our assumption are that firstly, google SVI is directly correlated with investor attention to stocks and effects the trading of that stock in positive / negative way dependent on calculated google SVI. Secondly, each index investor attention mainly led by stocks whose partial weight is much more higher than others. Thirdly, investor attention for each stock convert into transaction on

the desk in the same degree. Taking all into consideration, we included this independent investor attention variable upon already created regression formulas with macroeconomic variables and tested their effect on stock returns. Our results show that investor attention has not any find meaningful contribution to index returns.

In the last part of thesis, we employed investor sentiment via bloomberg news sentiment and created an investor sentiment independent variable (index sentiment) based on top ten stock of each index regarding partial weight of these stocks in index. After that, we included this independent investor sentiment variable upon already created regression formulas with only macroeconomic variables because of nonfeasible results of investor attention. According to our analysis, we find meaningful contribution of investor sentiment to BIST 100 total index returns at 95 % signifacance level even if analyzed stocks has less representative power than other index with 68,05 %. It can be easily inferred that BIST 100 total index has higher homogenity from the side of stock extension. Moreover, BIST 100 total index has been classified according to highest outstanding capital. So, it means that investors are more likely to transform their sentiment into transaction in trade desk via buy or sell and market efficieny is higher at BIST 100 total compared to other BIST 100 index. In a nutshell, our incremental methodology employing macroeconomic variables, google sv₁ and bloomberg news sentiment,are able to explain variaties several BIST index from 44,50 % to 12,20 % and has an important place in the literature combines macroeconomic indicators, investor attention and investor sentiment in one research.



MAKROEKONOMİK GÖSTERGELER & GOOGLE ARAMA ENDEKSİ & HABER DUYARLILIĞI İLE HİSSE SENEDİ GETİRİ TAHMİNİ

ÖZET

İnsanlık tarihinin boyunca, geleceğin tahmini bilim ve iş dünyasında başarının anahtarı olmuştur. Tutumluluk ve gelecek odaklılık kavramlarıyla yatırım giderek daha önemli hale gelmiş, yatırımcılar ile girişimcilerin bulunduğu bir dünya inşa edilmiştir. Tasarruflar yatırımlara dönüşerek ekonomik büyümeyi arttırmıştır. Eski geleneksel finans dünyasında, yatırım kararları beklenen nakit akımı üzerinden modern teknikler uygulanmadan verilirken, risk kavramının ortaya çıkışıyla beraber CAPM, EMH ve APT gibi teoriler yatırım kararlarında uygulanmaya başlanmıştır. Rasyonel yatırımcıların kullandıkları bu teoriler hisse senedi pazarındaki bütün fiyat hareketlerini açıklamada yetersiz kalmıştır. Etkin pazar hipotezindeki en büyük eleştiri de, hisse senedi piyasasındaki bütün paydaşların aynı bilgiye sahip olması ve yeni bir bilginin tüm paydaşlara aynı zamanda aynı şekilde yayılması kabulüdür. Bu kabulün sonucu olarak hisse senedi piyasasında hiçbir yatırımcının beklentilerin ötesinde, ekstra kar elde etmesi mümkün değildir. Bu teoremin doğru olması demek piyasada tek yönlü fiyat hareketlerinin olup, eninde sonunda finansal sistemin çökmesi anlamı taşımaktadır. Oysaki bilginin alınması ve değerlendirilmesi bir çok sosyal, genetik faktörün yanında, kişilerin sahip olduğu entelektüel sermayeye göre değişmektedir. Şu bir gerçek ki tüm yatırımcılar rasyonel değildir ve her zaman mantıklı kararlar veremez. Tek bir makroekonomik çevresinden bahsediyor olsak dahi, bunun algılanması ve değerlendirilmesi kişiden kişiye farklılık göstermektedir. Bir yatırımcının her bir birim kazançtan elde ettiği marjinal fayda ve her bir birim kayıptan duyduğu marjinal kayıp, yatırımcının kar/zarar algısına, mevcut refah düzeyine, birçok nesnel ve öznel faktöre bağlıdır. Bütün bu gizli etkiler davranışsal finansın konusudur. Davranışsal finansın temeli olan bilişsel süreç bilginin algılanması, işlenmesi ve değerlendirilmesi üzerine kuruludur. Eskiden içgüdü olarak nitelendirilen bu kavramın günümüzdeki karşılığı yatırımcı ilgisi ve yatırımcı duyarlılığıdır ve fiyatlandırmaların önemli bir bileşenidir. Özellikle belirsizlik ve dalgalanmanın yüksek olduğu zamanlarda yatırım kararları tamamen matematiksel hesaplara bağlı olarak yapılmaz. Bu tür ortamlarda içgüdü'nün karar üzerine oldukça önemli bir etkisi vardır. Gerçek hayatta çoğu insan kesin bir kazancı adil bir kumara, yani çoklu çıktısı olan bir karara tercih eder. Bu nedenle beklenen değer mantığı gerçek hayata uygun olmaz. Riskten kaçınma eğiliminin yanında ilk etki, rastlantısal tutarlılık, fazla güven, iyimserlik & hüsnüzan, temsil kısayolu gibi davranış şekilleri, yatırım kararlarında yatırımcılar tarafından kullanılmış olup balonların ve gerçek dışı fiyatlamaların oluşmasına neden olmuştur. Öyle ki bu olağandışı fiyatlamalar bazen oldukça uzun zaman bu söz konusu seviyelerinde kalmıştır. Tezdeki metodumuz orta vadede ekonomiye yön veren makroekonomik göstergelerin yanında davranışsal finans göstergelerini de içeren bir model geliştirmek olmuştur.

Herhangi bir faktör tarafından oluşan kısa dönemli dalgalanmalara rağmen hisse fiyatları makroekonomik ve mikroekonomik göstergeler doğrultusunda oluşmaktadır. Makroekonomik göstergeler hisse fiyatlarını tahmin etmede öncül göstergeler olurken, yüksek büyüme, operasyonel kar, Pazar payı artışı, yeni satınalmalar gibi mikroekonomik göstergeler artçıl özelliğe sahip olup gerçekleştirmelerine müteakip şirket performansı hakkında bilgi verir. Tezde, makroekonomik göstergeler tarafında sekiz farklı gösterge, beş farklı BIST 100 endeksi üzerinde analiz edilmiştir. Mikroekonomik faktörlerin etkisini incelemek amacıyla yatırımcı ilgisi için google arama endeksi, yatırımcı duyarlılığı için de bloomberg haber duyarlılığı kullanılmış, mikroekonomik faktörlerin etkisinin yatırımcılar tarafında bu iki faktörde vuku bulunduğu varsayımı yapılmıştır. Böylece modelimiz davranışsal finans faktörleri ile de entegre hale getirilmiştir.

Tezimizdeki ana motivasyon, yatırımcıların kullanımı için istatistiksel olarak anlamlı olmasının yanında ekonomik olarak hisse yatırımlarında avantaj sağlayacak, yatırım stratejilerinin belirlenmesinde yardım sağlayacak bir model ortaya koymaktır. Tezin ilk bölümünde üretici fiyat endeksi, endüstriyel üretim endeksi, ticari banka fonlama oranı, kur sepeti, altın ons fiyatı, merkez bankası M2 para arzı, brent petrol fiyatı (dolar), bakır fiyatı (dolar) makroekonomik değişkenler olarak ele alınmış olup, BIST 100, BIST 100 servis, BIST 100 mali, BIST 100 sanai, BIST 100 teknoloji endeksleri üzerindeki etkileri incelenmiştir. Detaylı analizler sonucunda her endeks için modeller oluşturulmuş endeks dönüşleri üzerindeki değişimlerin 12,20 % ' den 33,40 % ' a kadarı 95% güven seviyesinde bu modellerle açıklanmıştır. Bu değişkenlerden üretim endeksi, ticari banka fonlama oranı, kur sepeti, altın ons fiyatı, merkez bankası M2 para arzı olmak üzere yalnızca beş tanesinin 95 % güven seviyesinde çeşitli BIST 100 endekleri üzerinde anlamlı ve güçlü bir etkisi bulunmaktadır. Üretici fiyat endeksi, brent petrol fiyatı ve bakır fiyatının anlamlı ve güçlü bir etkisi görülmemiştir. Merkez bankası para arzı kur sepeti ve altın fiyatı çeşitli BIST 100 endeksini açıkladığı ay etkilemekte ve en hızlı tepkiyici olmaktadır. Endüstriyel üretim endeksi açıklandıktan en az iki ay sonra BIST 100 endekslerini etkilemektedir. Merkez bankası M2 para arzı ve kur sepetindeki artış BIST 100 endekslerini negatif yönlü etkilerken, endüstriyel üretim endeksi, altın fiyatı ve ticari banka fonlama maliyeti pozitif olarak etkilemektedir.

Tezimizin ikinci bölümünde, makroekonomik değişkenler ile oluşturduğumuz modelimizin üzerine BIST 100 endekslerinde en yüksek ağırlığa sahip on hisselerin google arama indekslerinden oluşturduğumuz yatırımcı ilgisi değişkeni eklenmiştir. Buradaki ilk varsayımımız, google arama endeksinin yatırımcı ilgisinin direct göstergesi olduğu ve hisselerin pozitif veya negatif fiyat hareketleri üzerinde anlamlı etkisinin olduğudur. İkinci olarak, endeks yatırımcı ilgisinin, endeksi oluşturan hisselerin tekil yatırımcı ilgilerinin endeks üzerindeki ağırlıklarınca etkilediğidir. Son olarak da yatırımcı ilgisinin etkisinin hisse alım satımlarına etkisinin bütün hisse senetlerinde aynı şekilde realize olduğudur. Bütün bu varsayımlar altında, yatırımcı ilgisi değişkenleri yaratılarak makroekonomik değişkenler ile oluşturduğumuz modelimize eklenmiş ve

hisse getirileri ile ilişkisi analiz edilmiştir. Bulgularımız göstermektedir ki yatırımcı ilgisinin hisse senedi getirileri üzerinde anlamlı ve güçlü bir etkisi bulunmamaktadır. Tezimizin ikinci bölümünde, makroekonomik değişkenler ile oluşturduğumuz modelimizin üzerine BIST 100 endekslerinde en yüksek ağırlığa sahip on hissenin bloomberg haber duyarlılığı ile oluşturduğumuz yatırımcı duyarlılığı değişkeni eklenmiştir. Yatırımcı ilgisinin model üzerindeki olumlu olmayan sonucu nedeniyle makroekonomik değişkenler ile oluşturduğumuz model üzerinden gidilmiştir. Analiz bulgularımızca göre BIST 100 endeksinde oluşturduğumuz yatırımcı duyarlılığı değişkeninin endeks temsil gücü 68,05% olmasına karşın yatırımcı duyarlılığı BIST 100 endeksi üzerinde 95% güven seviyesinde anlamlı ve güçlü bir etkiye sahiptir. Buradan hareketle BIST 100 toplam endeksinin diğer BIST 100 endekslerine oranla daha homojen bir dağılıma sahip olduğunu kolayca söyleyebiliriz. Bununla birlikte BIST 100 toplam endeksi daha yüksek sermayeye sahip firmalardan oluşmakta, yatırımcı duyarlılığı hisse alım veya satımına daha kolay dönüşmektedir ve diğer BIST 100 endekslerine göre daha etkin bir piyasa olmaktadır. Özetle, makroekonomik göstergeler, google arama endeksi ve bloomberg haber duyarlılığından oluşan modelimiz çeşitli BIST 100 endekslerindeki değişimin 44,50 % ile 12,20 % arasında açıklama gücüne sahip olmakla beraber makroekonomik göstergeler, yatırımcı ilgisi ve yatırımcı duyarlılığını birlikte ele alması sebebiyle literatürde önemli bir yere sahip olmaya adaydır.



1. INTRODUCTION

Investment is, by general means, driving available sources and opportunities to future with the aim of increasing affluence or meet the needs in certain period of time. The word “investment” has been widespread in crowds go back to renaissance and reform at Middle Age Europe. The movement arises from victory of Protestantism over catholic not only reshape relation of God to human but also make radical changes of society too. “Live the moment” mentality has been abandoned, prudence and fasting has been burst up, “future” reach significance compared to “today” (Bernstein,2016). Within prefer and decide stepped in daily life, It has been seen that future includes opportunities too besides of threads. Long term planning has been employed, investment instruments created, humanity started to make saving and canalize it through investment as believing in higher future return expectation, wealthier future.

After the introducing future expectation with fasting through investment in more generalized grand narrative, gathering to information was the primary key to get wealthier future for the investors anymore. So, early theories, we will use the terminology as traditional investment have been shaped over information flow and planning over future cash flow. In early traditional finance, the assets has been priced using present net value depends on future cash flow and discount factor. Even if people make it unconscious way as considering the payback period of investment, it was the most basic way to in the process of investment decision. In the later period, as new era in finance world has been opened with Markowitz’ s fourteen pages journal named “Portfolio selection”. Markowitz modelled the returns relation with risk and stressed the importance of risk in investment evaluation although the general attitude is just focusing maximum return on investment (Bernstein,2016). Even if he does not used “risk” word implicitly, he described his focus to minimize variance to get desired return and use variance as a direct proxy of risk (Markowitz, 1952). The criticisms through possible fails of positive relationship between risk and returns over empirical study has been

overcome by his student's model includes stocks relationship with stock market. Capital asset pricing model presents a relationship between systematic risk of asset and expected rate of return (Sharpe, 1964). Even if it enables basic comparison between portfolio returns, CAPM has so many assumptions like constant risk free rate over periods, volatility is the direct measure of risk and most importantly does not regard in formulation any non-linearities like pay offs of portfolios. But, it is the absolute main point in the literature to make research initiated in this area. Efficient market hypothesis presented by Fama (1970, p, 383) ;

“A market in which prices always “fully reflect” available information is called “efficient”.

assumes all parties in the market have been informed at the same level and new information diffuses all parties at the same level instantly. As a result of this assumption, nobody in the market can make additional profit over the given output calculated over expected future price, discount rate and dividends. But, it is not true at all times. Even if we assume, each investor has the same information at the same time, sense and evaluation of it changes according to many social, genetic and intellectual property that they accumulated in wisdom. As foreseen deficiencies and critiques to CAPM have brought arbitrage pricing theory employs macroeconomic variables in a linear relationship to predicting asset returns (Ross, 1976). Reciprocal and incremental way, Fama (1981, 1990) employs APT methodology and explore statistically meaningful relationship between stock returns and some macroeconomic variables. Within the widespread use of internet, and pace of development in technology gives a momentum through market more efficient within easy circulation of information through all investors. At this way, changes in many preliminary indicators have been used to investigate the relationship with stock returns. Industrial production index, interest rates, currency exchange rates, gold price, money supply, Brent oil price, copper, inflation rate and many combined and derived index were the outstanding ones. Moreover, upcoming financial crises, any possible abrupt decrease or increase in a commodity too included in these researches. In the study of prediction of currency crisis at Southern Asian countries with macroeconomic indicators seventeen different macroeconomic indicators have been investigated (Budsayaplakorn et al., 2010). Chang et al. (2019) examine periodic impacts

of macroeconomic variables on stock prices of KSE 100 index and concluded that consumer price index an industrial production index has positive effect on Stock prices while interest rates, trade balance and exchange rates effects negatively.

Even though there are succesful and appreciated studies with macroeconomic indicators effects on stock returns , It is still not sufficient to explain stock returns at all times. It is not a rigid formulation that already declared indicators. There are some hidden effect that subject to behavioral finance. It is absolute reality that all investors are not rational and could not make sensible decisions at anytime. If they makes rational decision and all information flow diffuse in same way to ideas turn into action in same way through financial markets, we would see only one way movement in the markets, and inevitably would yield with collapse of financial system.

Even if there is one macroeconomic environment with same set of data for anyone, it makes differentiate person by person to capture and evaluation of it. Marginal satisfaction of investor from each unit of earning and marjinal disfavor from each unit of loss depends on investor' s sense of profit/loss, available prosperity and a few more objective & subjtive factors too. Leading theorician in behavioral pshchology Daniel Kahneman, nobel prized at 2002, asserted that his trials has been showed that, mostly 3 dollars has been preferred when there are two option at stake; 100 % quaranteed three dollars and 80 % quaranteed four dollars. Whereas looking for expected returns respectively there dollars and three dollars and twenty cents, people does not make rational decisions (Rickards, 2016). But, we need to ask that does rationality stand for just expected value ? Let' s think about it, If we make the choices one hundred times, and percentage is exactly valid for this sample, we will have 300 USD at one side and 320 USD at the another. But in the life, each decision has the unique environment, and feelings at that moment of people. Apart from there, If we make only one choice, which one is more rational to choice ; 100 % quarantine 3 dollars or 80 % possible 4 dollars includes 20 % 0 dollars and 80 % 4 dollars. If you need money too, three dollars will be more meaningful independent of expected values. In the article "Exposition of a New Theory on the Measurement of Risk" famed with St. Petersburg paradox, Bernoulli (1954)' s first paragraph start with the opposition to expected value as perceived way by people as a receipt of decision making process that used real in life. Price and

probability are not enough to estimate the price of any asset. Benefit of investor has been depended on special and unique conditions that he is in even if matter of facts are the same for anybody (Berstein,2016). His approach starting to irrationality and by means behavioral finance importance. So behavioral finance needs to be considered as important factor investment decision process and stock prices too.

Keynes (1936) is one of the first academician and believe and stress the importance of behavioral finance as describing it as investor sentiment. He believes that it is purely wrong to conclude as all fluctuation is result of irrational behavior. But He stressed that all decision from personal to economic or political is not result of explicit mathematical calculation too. In old times that advanced calculation is not available, people make choices from alternatives in their available capacity as using sentiment as their inner gut feeling. De long at al. (1990) indicates noise trading base on estimating investor sentiment yield risk on pricing on assets and deter to rational arbitrageurs for taking aggressive positions, may result even higher returns on portfolios noise traders. They make it first mathematical modelling to explain a few anomalies in prices resulted from noise trading. Widely usage of internet and digitalization present very wide range of platforms that investors has been sharing their ideas and price expectations on prices. Message boards, yahoo finance, investing.com and twitter are widely used ones that includes monumental data to accumulate, analyze and use to measure investor sentiment. Especially in twitter, people share, discuss their ideas about stocks, give a way their decision to manage their portfolios. It enables high advantage to emerging markets that we can assume less efficient market because of limited access of market data by some investors. 100 % certain analysis is not possible but give very important indications to follow up and grab to sense of behaviours.

Many pricing theory assumes that all information in the market instantaneously reflected on prices when it goes public. Kahneman (1973) indicated that attention is limited mental source and can not expected by all investors show itself as the same agility. Many theorician accept it with their studies sensitivity of stock prices with media coverage in various ways; bid pressure, price increase and trading volume for increase in attention (Barber and Odean, 2008), price decrease and sluggish behaviours in case of limited attention (Hirshleifer and Teoh, 2003). Even though it has been accepted that

attention of investor is one of the dynamic indicator asset price, It was difficult to allot a direct measurement to it. There were a few indirect proxies of it generally taking into consideration: advertising expenses (Lou, 2014), extreme returns and trading volume (Barber and Odean, 2008), price limitations (Seasholes and Wu, 2007). Introducing with search engines services like Google search volume index, it is possible to measure it as a direct input.

As taking all initial views of investment history from middle age and a brief view of development in the study of predicting asset prices, My thesis motivation is to provide a methodology to investors not only statistically significant but also economically beneficial, works in real life into investment strategies. Researches shows that macroeconomic indicators are good but not sufficient indicators with itself to predict stock returns. In the first part of thesis, we analyzed several stock indexes of Turkey, important emerging market with the structure of less efficient compared to developed countries, with several macroeconomic indicators and looked for answers of research questions :

*Do macroeconomic indicators have material and significant effects on stock indexes ?

*Which macroeconomic indicators effect which indexes? Is there available any differentiation?

*What is the time lag of each indicators' effect on stock indexes?

After creating statistically representative regression formulas for each index with respective macroeconomic indicators, we included behavioral factors, initially investor attention via google SVI and looked for more representative formulation to stock return prediction. In the last phase, we employed second behavioral factor investor sentiment via bloomberg social velocity and try to find statistically significant but also works in real life into investment strategies for Turkey stock market.



2. LITERATURE REVIEW AND HYPOTHESES

In this section we will review the literature of investment decision and factors employed along the history to predict asset prices. Within the development is the area of risk and probability, capital asset pricing theory, arbitrage pricing theory, macroeconomic variables, investor sentiment and investor attention has been employed in the research in different combinations but separately with two main group; behavioral finance (investor sentiment and investor attention) to statistical / Bayesian finance (CAPM, APT, Macroeconomic indicators). Upon detail analysis of research in asset pricing, we propose a novel methodology which taking into consider macroeconomic indicators, investor sentiment and investor attention in one methodology, examining progressively. Besides of theoretical and empirical basis has been detailed, challenges and antithesis has been illustrated.

2.1 Traditional Finance Concepts

After the renaissance and reform at the Middle Age Europe, commerce development is getting more dependent on service industry and give a momentum to finance industry all around the world. Commerce development transform somehow gambling principles into creating wealth, inevitably embodied form of risk taking capitalism. It was never possible to make progress without two new scopes after the several years accepted mentality that future is will of God or just a luck. The first one, besides of unsophisticated application, brings new counting, calculation technics is that accounting. The other one, very sophisticated application, connect risk taking degree with income is that estimation. St. Petersburg paradox make a breakthrough amendment with concept of utility, investor sentiment, human capital and stressed that investors decisions apply mathematical measurement and basic instinct at unclear market conditions. Bernoulli (1954) oppose the general accepted expected value as perceived way by people as a

receipt of investment decision making process that used real in life. Price and probability are not enough to estimate the price of any asset. Benefit of investor has been depended on special and unique conditions that he is in even if matter of facts is the same for anybody (Berstein, 2016). Besides of hypothesis of risk allotted to investment differs from person to person, He indicates that marginal utility of each unit of increase in affluence is the inversely proportional that already owned prosperity. This hypothesis is one the most intellectual spurt in the finance history. Some research examined it under behavioral finance start with gut feeling transforms into investor attention and investor sentiment. CAPM, APT has been developed after 226 years later than Bernoulli' s Theory and explicitly disregard human behavior at asset pricing.

2.1.1 Gut feeling and present value analysis

Taking into most important decisions in human history or in our personal life, the factor of our basic instinct has been monumental factors in case of all mathematical reasoning has been supplied to us. We need to it conform at our mental litmus test. That basis instinct or litmus test, besides of experiences, consist of genetical factors and cultures which needs to be passed at least two generations (Le Bon, 2018). According to experimental studies, there is apparent correlation with brain cortical surface and cognitive ability which is the base factor of agility and accuracy of decision (Gignac et al., 2003). When age becomes older, physically brain volume and cortical surface has been shrinking and new thing learning and adaptation has been harder. But the basic instinct that compromise experiences and ability to evaluation wider. Basic instincts gut feeling, plays important role in decision making (Goldberg, 2006). Bernoulli (1954), the first time accepted by widely crowded, make connection of gut feeling with experiences that It must be accepted an event occurrence or nonoccurrence path of way follow past experimented patterns under similar condition. Even if the underlying meaning has been underestimated along the history, gut feeling is the basic denomination of routine scientific approach. Cognitive process, basis of gut feeling, is to rely on perceiving, processing, evaluation of information and process of decision making (Miller, 1989). So, cognitive ability accompanied with experience is not only traditional finance era' s driver to pricing of asset but also at today in transforming way. Liebowitz et al. (2019)

surveyed different level of employees' preferences for data analysis versus gut feeling. In the web base survey, five-point scale responses have been identified through rigid data analysis and intuition scales for gut feeling. Findings shows that less experienced employees denominated as "feeling theorist" are more tend to rely on gut feeling rather than explicit fact and experiences. On the other hand, "big picture modelers" are tend to use their experiences with explicit facts and rely on holistic big picture. The environment, which has high uncertainty about the future, is the most widely used atmosphere of gut feeling in investment decision. At this way, entrepreneurial investment decisions of angel investors are one of them at any time as an example of extreme uncertainty. Huang and Pierce (2015) employs the managing uncertainty in investment decisions and examine gut feeling at angel investors. They prepared a specific business case includes two-page executive summary, market due diligence and ask the questions to 135 experienced (average 10 years' service of length and at least 8 investment) investors about business cases and business viability from very positive to very negative scale. Results show that they did not consider minimizing their risk on the contrary of today's world general attitude through maximizing expected return / exposed risk. General mindset of angel investor that formulation such an unclear risk through success or failure cannot be formulized in laboratory environment. They can be predicted only apply experiences available in their know how and gut feeling. Actually, that is why they bring huge returns. From early ages through today' s world, present value analysis and discounted cash flow methodology has been employed in investment decision process at different professionalism levels even if early ages the investors did it unconscious way as predicting future possible cash flow applying different insights and experiences that they owned. After the years 1960s, especially with development on risk analysis and accounting, they are initiated to use in stock price determination too while it is widely used for project financing with finite live. Two methodologies have been commonly used: straight liquidation approach and liquidation-going concern approach. In straight liquidation approach, stock value has been determined on the basis of liquidation scenario of company. In this scenario, it is assumed that there will be no additional capital expenditures upon available assets and firm will operate accordingly until available machine park lifetime. Available dividend performance has been

normalized with a discount rate according beginning cash balance and residual year's free cash flow (Margoshes, 1961). The hurdles in there are allotting one decline rate to dividend represent operating performance over residual estimated period of operation without any additional capex and one discount factors to get reach to present value that represent minimum rate of return investor desired. Applying most proximate discount rate to reach present value is crucial for high inflationist economies even if it is not expected to yield big variances for developed economies with low inflation ratio.

Illustrating straight line liquidation over one example with hypothetical company;

Number of Shares: 100.000

Net income / share: 4,20 USD

Cash income after tax / share: 5,00 USD

Economic lifetime: 20 years

Rate of decline in cash income w/o any Capex: 8 %

Rate of return (discount rate of PV): 12 % & 15 % applied respectively

Table 2.1 : Liquidation – straight line approach.

| End of the year | Forecast Cash Income* / share at 8% decline | Discount Factors | | Present Value of Liquidating dividends | |
|-----------------|---|------------------|-------|--|----------------|
| | | 12% | 15% | 12% | 15% |
| 0 | \$5,00 | 1,000 | 1,000 | \$5,00 | \$5,00 |
| 1 | \$4,60 | 0,893 | 0,870 | \$4,11 | \$4,00 |
| 2 | \$4,23 | 0,797 | 0,756 | \$3,37 | \$3,20 |
| 3 | \$3,89 | 0,712 | 0,658 | \$2,77 | \$2,56 |
| 4 | \$3,58 | 0,636 | 0,572 | \$2,28 | \$2,05 |
| 5 | \$3,30 | 0,567 | 0,497 | \$1,87 | \$1,64 |
| 6 | \$3,03 | 0,507 | 0,432 | \$1,54 | \$1,31 |
| 7 | \$2,79 | 0,452 | 0,376 | \$1,26 | \$1,05 |
| 8 | \$2,57 | 0,404 | 0,327 | \$1,04 | \$0,84 |
| 9 | \$2,36 | 0,361 | 0,284 | \$0,85 | \$0,67 |
| 10 | \$2,17 | 0,322 | 0,247 | \$0,70 | \$0,54 |
| 11 | \$2,00 | 0,287 | 0,215 | \$0,57 | \$0,43 |
| 12 | \$1,84 | 0,257 | 0,187 | \$0,47 | \$0,34 |
| 13 | \$1,69 | 0,229 | 0,163 | \$0,39 | \$0,27 |
| 14 | \$1,56 | 0,205 | 0,141 | \$0,32 | \$0,22 |
| 15 | \$1,43 | 0,183 | 0,123 | \$0,26 | \$0,18 |
| 16 | \$1,32 | 0,163 | 0,107 | \$0,21 | \$0,14 |
| 17 | \$1,21 | 0,146 | 0,093 | \$0,18 | \$0,11 |
| 18 | \$1,11 | 0,130 | 0,081 | \$0,14 | \$0,09 |
| 19 | \$1,03 | 0,116 | 0,070 | \$0,12 | \$0,07 |
| 20 | \$0,94 | 0,104 | 0,061 | \$0,10 | \$0,06 |
| | \$51,65 | | | \$27,55 | \$24,77 |

* It is presumed that cash income after tax has been liquidating as dividends at year end

It is assumed that our hypothetical company has 420.000 USD net income and 500.000 USD cash income after tax means respectively 4 USD and 5 USD per share. We assume that available machine park w/o any additional capex will allow 20 years of lifetime. Assuming all earnings will be reflected on dividends, available dividend will decline 8% / year. Investor's minimum rate of return has been simulated with 12% and 15%. According to allotted criteria given at above, investment value of stock is 24,77 USD/share with required rate of return 15 % as given Table 2.1. If the desired rate of return has been decreased to 12 % the value of stock has increase to 27,55 USD. When investor desired to make more return, which means lower stock valuation, the stock price has been decreased.

The other method, liquidation-going concern approach, the firm is assumed to work in a dedicated time of operation. After the stock pricing date, is named transaction date for M&A process, free cash flow has been determined with estimated EBIT over period and terminal value has been included average of EV/EBITDA and perpetual growth terminal value. Intrinsic value, present value of stock considering all future cash flow, has been calculated and intrinsic value of stock has been calculated.

Illustrating liquidation-going concern approach over one example with hypothetical company;

Corporate tax rate:22 %

Discount rate: 15 %

Perpetual growth rate: 5 %

Outstanding shares: 230.000

Enterprise Value / EBITDA multiplier: x8

Cash: 200.000

Debt: 20.000

Capex/year: 10.000

It is assumed that we make studied stock price of our hypothetical company that is available on stock market, bid price at the transaction date is 2 USD, five-year period has been considered to evaluate at today's intrinsic stock price. It is estimated that EBIT from 2020 to 2024 has been resulted 50.000 to 58.000, 200.000 USD cash and 20.000 USD debt available on balance sheet. The company has 10.000 USD capital expenditures for each year. To calculate intrinsic value of company, terminal value has been calculated of average EV/EBITDA and perpetual growth terminal value. Gordon growth model is used at perpetual growth terminal value (Gordon, 1962):

Perpetual growth terminal Value = Termination Year Free Cash Flow * ((1+perpetual growth rate) / (discount rate – perpetual growth rate))

In our hypothetical example perpetual growth terminal value = 47.968* (1+0,05) / (0,15-0,05) = 503.664

Final terminal value is average of perpetual growth and EV/EBITDA = 535.832

Using Terminal Value, Enterprise value has been calculated with net present value of (22.813;45949;46.722;47.169;535.832) =431.290, After including Cash and debt position equity value has been calculated 611.290 USD means 2,66 USD/share as given Table 2.2. Taking all the parameters and assumption that we made, we can say that the stock seems undervalued according to: liquidation – going concern approach and may be good investment alternative considering 2.00 USD market price.

Table 2.2 : Liquidation – going concern approach.

| Assumptions | | Cash Flow | | | | | | | | |
|-----------------------|------------|-----------|--|--|--|--|--|--|--|--|
| Tax Rate | 22% | | | | | | | | | |
| Discount Rate | 15% | | | | | | | | | |
| Perpetual Growth Rate | 5% | | | | | | | | | |
| EV/EBITDA Multiple | 8,0x | | | | | | | | | |
| Transaction Date | 30.6.2020 | | | | | | | | | |
| Fiscal Year End | 31.12.2020 | | | | | | | | | |
| Current Price | 2,00 | | | | | | | | | |
| Shares Outstanding | 230.000 | | | | | | | | | |
| Debt | 20.000 | | | | | | | | | |
| Cash | 200.000 | | | | | | | | | |
| Capex | 10.000 | | | | | | | | | |

| Discounted Cash Flow | Entry | 2020 | 2021 | 2022 | 2023 | 2024 | Exit | Terminal Value |
|----------------------|-----------|--------|--------|--------|--------|--------|---------|------------------|
| Date | 30.6.2020 | 31.12 | 31.12 | 31.12 | 31.12 | 31.12 | 31.12 | Perpetual Growth |
| Time Periods | | 0 | 1 | 2 | 3 | 4 | | EV/EBITDA |
| Year Fraction | | 0,50 | 1,00 | 1,00 | 1,00 | 1,00 | | Average |
| EBIT | | 50.000 | 52.000 | 54.000 | 56.000 | 58.000 | | 503.664 |
| Less: Cash Taxes | | 11.000 | 11.440 | 11.880 | 12.320 | 12.760 | | 568.000 |
| Plus: D&A | | 17.000 | 16.000 | 15.000 | 14.000 | 13.000 | | |
| Less: Capex | | 10.000 | 10.000 | 10.000 | 10.000 | 10.000 | | |
| Less: Changes in NWC | | 375 | 611 | 398 | 511 | 272 | | |
| Unlevered FCF | | 45.625 | 45.949 | 46.722 | 47.169 | 47.968 | | |
| (Entry)/Exit | (280.000) | | | | | | 535.832 | |
| Transaction CF | - | 22.813 | 45.949 | 46.722 | 47.169 | 47.968 | 535.832 | |
| Transaction CF | (280.000) | 22.813 | 45.949 | 46.722 | 47.169 | 47.968 | 535.832 | |

| Intrinsic Value | | Market Value | | Rate of Return | |
|--------------------|---------|--------------------|---------|--|------|
| Enterprise Value | 431.290 | Market Cap | 460.000 | Target Price Upside | 33% |
| Plus: Cash | 200.000 | Plus: Debt | 20.000 | Internal Rate of Return | 29% |
| Less: Debt | 20.000 | Less: Cash | 200.000 | | |
| Equity Value | 611.290 | Enterprise Value | 280.000 | Market Value vs Intrinsic Value | |
| | | | | Market Value | 2,00 |
| Equity Value/Share | 2,66 | Equity Value/Share | 2,00 | Upside | 0,66 |
| | | | | Intrinsic Value | 2,66 |

2.1.2 Capital asset pricing theory and arbitrage pricing theory

Capital asset pricing model present a relationship between systematic risk of asset and expected rate of return (Sharpe,1964) Even if It enable basic comparison between portfolio returns, CAPM has so many assumptions like constant risk free rate over periods, volatility is the direct measure of risk and most importantly does not regards in formulation any non linearities like pay offs of portfolios. But, It is the absolute main point in the literature to make reasearch initiated in this area.

Efficient market hypothesis presented by Fama (1970, p,383) ;

“A market in which prices always “fully reflect” available information is called “efficient”.

assumes all parties in the market has been informed at the same level and new information diffuse all parties at the same level instantly. As a result of this assumption, nobody in the market can make additional profit over the given output calculated over expected future price, discount rate and dividends. But, it is not true at all times. Even if we assume, each investor has the same information at the same time, sense and evaluation of it changes according to many social, genetic and intellectual property that they accumulated in wisdom. As foreseen deficiencies and critiques to CAPM has brought arbitrage pricing theory employs macroeconomic variables in a linear relationship to predicting asset returns (Ross, 1976). Reciprocal and incremental way, Fama (1981) employs APT methodology and explore statistically meaningful relationship between stock returns and some macroeconomic variables. In the later period, three factor model, examined stock returns with the factors size of firms, book to market ratio & excess return, has been widely employed widely and extended by addition new factors to it in researches. Nevertheless, it was not sufficient to measure stock returns these factors disregarding of psychological factors.

2.2 Modern Finance Concepts

As humankind, most of us think that we are rational creatures even if most crashing crisis times. We like to embrace our self over the average from the aspect of intelligence, vision, leadership, experience. Who accept to be foolish investor, insufficient accountant? Alright, how much this belief is valid? It is not possible that everyone

shows rational and intelligent behavior at any time. Our decision is mostly taken in complicated and unclear moments. Mostly asserted models are presumed decisions that investors make and how to act in certain conditions in a rigid mathematical way. Many challenging studies show that deviations from models are more than our beliefs. Kahneman and Tversky (1979) modelled the expected utility theory and asserted that people tend to behave risk averse when it is stake big amounts. In other words, many people prefer certain earnings to a fair gambling. In their trials, a big portion of investors preferred three dollars when there are two options at stake; 100 % guaranteed three dollars and 80 % guaranteed four dollars. Whereas looking for expected returns respectively three dollars and three dollars and twenty cents. Extended with several examples, they rejected the mentalities that only rational behavior can stand alone in the competitive environment and each attitude eliminates rationality are just chaotic and not traceable. Their studies show that even if preference of people are not rational, they include an order and traceability. So it is easily inferred that just mathematical models disregarding human behaviors has less explanation power to reasoned movement in financial market. Aspired from this approach, we will employ behavioral factors besides macroeconomic indicators to explain stock returns in this thesis.

2.2.1 Macroeconomic indicators

After the APT has been introduced by Ross (1976), extended by Fama (1981) through exploring statistically meaningful relationships between stock returns and some macroeconomic variables, it gives momentum to research in relationships between macroeconomic variables and stock returns.

Lee (1992) explores causal and dynamic relationships within macroeconomic variables and stock returns using causality and vector-auto regression approaches. Interest rates, growth of industrial production and inflation rate have been analyzed over five time lags. Even if it is not resulted with any rigid regression formula, correlational relationships have been presented. According to it, stock returns have positive correlations with growth of industrial production while inflation has not any material indication over stock returns.

Patelis (1996) presents a new set of significant predictors of asset return. These monetary policy variables prediction power has been linked with financial propagation that enhance and catalyze financial health of companies and more effective in the easy money period compared to tight money period. Moreover, his analysis shows that unexpected stock returns are mainly attributed with financial variables.

Mukherjee and Naka (1997) investigate six Japanese macroeconomic variables' exchange rate, money supply, inflation rate, industrial production, government bond return, funding rate effects on stocks at Tokyo Stock Exchange by using vector error correction model and created a model has good performer predicting ability for VAR.

Takamatsu and Favero (2019) employ emerging market companies from twenty countries and apply cross sectional regression to three group of indicators to predict stock returns. First group, we can specify it as microeconomic perspective, includes, financial performance indicators consist of price to book ratio, capital expenditures, accruals, gross profitability and sales growth. Second group as measure country level differences, earning aggressiveness, loss aversion, earning smoothing has been taking into consideration. Lastly thirteen macroeconomic indicators, from GDP to M1 money supply, combined in one indicator. In this study, examined stock returns under the light of microeconomic, macroeconomic variables and country level differences, results show that microeconomic variables effects on stock price is higher than macroeconomic variables and country level differences do. Size of company has negative effect on stock returns.

Simakova et al. (2019) examines macroeconomic indicators effects on stocks which are operating at food and drink industry of European countries. They make concluded that GDP has positive effect on stock returns while interest rate and inflation rate has negative with using VECM and Johansen cointegration methods. On the contrary of widespread belief on economic theories related food and drink industry as resistant sector to economic cycles and disruption, it puts important facts on desk that it is also effected from macroeconomic variables too. Incremental and differentiating way, there are many research in the literature on macroeconomic variables and stock market relationship as seen at Table 2.3 and still increase day by day in volatile and uncertain future.

Table 2.3 : Predictors of stock returns.

| SOURCE | METHOD | SCOPE | PREDICTORS & EFFECT DIRECTION ON STOCK RETURN |
|----------------------------|--------------------------|--------------------|--|
| Lee (1992) | Time series VAR | U.S.A. | Interest rate (~) Industrial Production (+) Inflation rate (~) |
| Patelis (1996) | Multivariate regressino | U.S.A. | Federal funds rate (+) Spread of federal fund rate & 10 year t-note rate (-) |
| Boyd et al. (2001) | Cross section regression | Multiple countries | Inflation (-) |
| Kutan and Aksoy (2003) | Asymmetric GARCH model | Turkey | Inflation (~) |
| Kim and Wu (2008) | Panel data | Emerging Markets | Credit Rating (+) |
| Cherif and Gazdar (2010) | Panel data | MENA Countries | Financial sector development (+) Income Level (+) Interest rate (-) |
| Malik and Amjad (2013) | Granger causality | Pakistan | FDI (+) |
| Marques et al. (2013) | Time series VAR | Portugal | Economic growth (+) Stock market liquidity (+) Inflation (-) |
| Bayar (2016) | ARDL bounds test | Turkey | Economic growth (+) Stock market liquidity (+) Inflation (-) |
| Simakova et al. (2019) | VECM | European Countries | GDP (+) Interest rate (-) Inflation rate (-) |
| Sukruoglu and Nalin (2019) | Panel data | European Countries | Income (+) Stock market liquidity (+) Monetisation ratio (-) Inflation rate (-) |

Even if enormous number of research available at literature that examines the statistical data and try to put insight about historical relationship between

macroeconomic variables and stock returns, there is not available any formulation that shed the light to future stock returns at least limited at explanatory power. It is not expected too with only taking into consideration limited input consist of just rigid data disregarding behavioral finance. Motivated from that non availability, in our thesis, we follow an incremental method to explain stock returns with macroeconomic variables and behavioral finance indicators; investor sentiment and investor attention. Even if we must know the past and history of price movements to draw a comparison with today' s stock price development, it is certain that each moment in the world from past until today is unique and single that there is no other moments can be used to make a prediction for it (Knight, 1964). It is a valid doctrine encompass all world. From that perspective, each moment dynamics can be considered by just only behavioral finance indicators.

2.2.2 Behavioral finance

Traditional finance evolves over sole mathematical models along history which assumes all agents in the market are fully rational and their decisions is based on fully processed and very well evaluated information. In that outlook, it is not possible to take excess returns in a financial instrument because of information dissemination through all party yields fully right prices in the market. This mentality stands up with efficient market hypothesis assumes that rational agents in the market will immediately prevent prices to move irrational way and limits to arbitrage opportunities in short term. The controversial point that irrational agents enable this short time period more than expected and thereof what is the standard of short horizon? Those irrational agents have been assumed as individual investors who are lack of collective wisdom and actions in financial markets mainly based on their belief and behaviors accompanied unique circumstances of that moment. Each unique moment can show itself at different way. On the contrary of it, EMH assumes that each stock price comes to expected or average value after a short period of time. At this point, why does the literature has been flooded with research to estimate stock returns? if stocks follow the average or expected value. Why we cannot able to speak certain and self-confidently for stock prices. The basic response of that

questions that stock prices are not determinant of deific formulation it just moves with decisions of people. Let's assume that TESLA' stock, represent with TSLA stock ticker, price has been fallen to 500 USD / share upon irrational individual investor's bad mood on it while two-hundred-day average price was 700 USD /share. According to EMH, it is expected that rational agents seems it as an arbitrage opportunity and create buying pressure on it and moves to price level again to 700 USD/share. Finance literature denominates these rational agencies as "arbitrageurs" while "noise trader" has been commonly used for irrational investors. But it is not certain that yesterday's usual can be spread through uncertain future. Moreover, there are not available too many rational agents take consider to risk of collapse as moving action opposite way of bulks, we can enumerate only market frontiers investment agencies leads Warren Buffet, Benjamin Graham and Bernard Baruch even if availability of investment theory propose opponent to market to make money (Gallea and Patalon, 2016). If all securities return to its intrinsic value at the market, we had not acquainted any bubbles along history. But, it is not in the reality.

Irrational, noise traders' behavior in financial markets are the main indicators of price movement and the irrationality make stock prices stays beyond of fundamental value for a long time. Investor psychology plays important role at this irrational behavior shaped over belief that they have. Examination of literature review these beliefs mostly show itself as imprinting, random consistency, overconfidence, optimism and wishful thinking, representativeness, risk aversion tendency.

At the end of 1990s Konrad Lorenz discovered that gosling has been formed emotional bond with first moving object after they hatched. He was aware of that because of first saw object was himself in one experiment and they followed himself with affection. Lorenz proves not only environmental effect on decision when they born but also adherence to that decision after they did. He makes denominate this effect as "imprinting" (Ariely et al., 2003). Apart from there, is that possible that human brain structure is similar with gosling? Our first impressions and decisions has been adhered along our lives. In Fraud's terminology can "halo effect" be valid for human too? When we see a new product or examine a stock on the market, we accept the first price that we catch a glimpse. Willing to purchase will has been

shaped over this price and named as “nominal anchor” in the literature. After the discovery of Tahitian black pearl in 1973, first marketing efforts have been failed even if very low price level applied in customized exhibitions. Only after one year, marketing doyen Harry Winston put exorbitant price labels and exhibits them at fifth avenue store in New York. He gave one-page advertisement on fashion magazines to it with emeralds, diamond and ruby. After the one month, *creme de la creme* caste put on this black pearl on their necklace without demur. Irrational way “imprinting” has been worked in apply. Black pearl has been already imprinted into people minds with that value until today. It also proves that to increase desire to own something, only thing to do is to make it difficult to obtain. That is why we make desire the thing more which is close to run short. In stock market too, if there is an appetite greedily through a stock that increase constantly, it makes stimulate to our that neediness feeling.

As a further effect of “imprinting”, when the first price tag of a product/service encountered imprinted into minds, it is not only determinant of available prices via behaviors but also shape the future prices. That is the “random consistency”. (Ariely et al., 2006) examines a study at MIT Sloan executive class to prove random consistency. They presented five different products to students; 1996 Hermitage wine, Logitech mouse, Logitech keyboard and mouse, a design book, Belgium chocolate. They distributed forms that detail information embedded and then requested student to write their national identity number’s last two digits on the left hand upper side of paper and repeat to write it besides of each products on scoring page. After this completed by students, filling “yes” or “no” marks are requested assuming that national identity last two digits are the price of products. Upon analysis of collecting form, it is resulted that national identity numbers have been played a nominal anchor and highest two-digit national identity numbered students from 80 to 99 gives the highest offer.

Looking back to entrepreneur history, there are many companies go into bankruptcy after some period of time later they have been created. Some of them already born to dead, the others have underlying causes based on overconfidence. Overconfidence has two main contributors; self-attribution and hindsight bias (Kent et al., 2001).

Humankind tends to ascribe any successful decision to himself while any disfavor result connected through bad luck. This makes himself to boost inherent talent that he believes (Gervais and Odean, 2001). In the stock market, beating the stock market which believed most intelligent people, gives the investors that self-attribution if they are making money even if they have just noise trader and did it by luck. Hindsight bias is the belief of investors through knowing all the things which what happens in the market now. That create incremental one through investor predict to future better than anyone else (Neal and Kathleen, 2012)

Seybert and Bloomfield (2009) conducting an experiment to analysis wishful thinking and wishful betting availability in the stock market. Historical perspective, it is the common belief that people tend to be biased positive on desired events, accompanied with betting to it. In the first experiment, they give initial long positions to traders in the experiment and search or any effect of it for further decisions. The results show that initial positions effects further actions they did take and gain over it feeds to wishful thinking in a virtuous cycle way. In the second phase, they see that wishful thinking and optimism have been disseminating through other traders in the group. It is apparent that optimism can be a problem for financial markets as resulted with overvaluation and bubbles in the market.

Sampling is the statistical method that put the figures analyzed to representing bulk group in determined confidence level but It cannot be determined that assuming it as fully represent to whole. Moreover, its effect on investor decisions does not accompany as a scientific method, just come with a few samples about stock price movement and a few previous right forecast of an investment consultant. Noise trader does not make deep analysis at hand data is enough to represent to whole. They just accept only from a few indications. (Gennaioli and Shleifer, 2018).

Imprinting, random consistency, overconfidence, optimism & wishful thinking and representativeness has been indicators of investors employed in the process of decision making in the stock market. Each of this behavioral indicators have the factor of investor sentiment and investor attention that we will mention at below. They will be main components of our model.

Our decision is mostly taken in complicated and unclear moments. Mostly asserted models are presumed decisions that investors make and how to act in certain conditions in a rigid mathematical way. Many challenging studies show that deviations from models are more than our beliefs. Kahneman and Tversky (1979) modelled the expected utility theory and asserted that people tend to behave risk averse when it is stake big amounts. In other words, many people prefer certain earnings to a fair gambling. In their trials, a big portion of investors preferred three dollars when there are two options at stake; 100 % guaranteed three dollars and 80 % guaranteed four dollars. Whereas looking for expected returns respectively three dollars and three dollars and twenty cents.

2.2.2.1 Investor attention

Many pricing theory assumes that all information in the market instantaneously reflected on prices when it goes public. Kahneman (1973) indicated that attention is limited mental source and can not expected by all investors show itself as the same agility. Many Theorician accept it with their studies sensitivity of stock prices with media coverage in various ways; bid pressure, price increase and trading volume for increase in attention (Barber and Odean, 2008), price decrease and sluggish behaviours in case of limited attention (Hirshleifer and Teoh, 2003). Even though it has been accepted that attention of investor is one of the dynamic indicator asset price, It was difficult to allot a direct measurement to it. There were a few indirect proxies of it generally taking into consideration: advertising expenses (Lou, 2014), extreme returns and trading volume Barber and Odean, 2008), price limitations (Seasholes and Wu, 2007). Introducing with search engines services like google, baidu and yandex search volume index, it is possible to measure it as a direct input. No matter noise trader or arbitrageurs, investors make a huge research on web in the process of analysis to support final decision on stock for possible actions. We accept google search volume index as direct measure of attention because of representing data over stock tickers that can be searched only by investors have an attention to stock. The investor can make research either to take long position or to short position. Assuming in two different time interval, we can have same google SVI index for stock x even if one is mostly composed of long position thinkers and the

other side is short position thinkers. At this perspective, We have advantage resulted from examination of turkey stock market has worked only on one leg, long position. Short position availability and mechanism very limited and different from efficient market. Somehow it is risky for setting up healthy prices, one the other hand prevents speculations. Anyhow, It will give absolute advantage to our analysis to implement into multiple regression as indicator.

Shi et al. (2012) has indicated that investor attention creates a short term price pressures on stock but on the long term effect is through decreasing on investment returns on the research Shanghai and Shenzhen stock exchanges via baidu abnormal search volume index.

Sicherman et al. (2016) determined eight different hypotheses as seen Table 2.4 and test them in his study based on panel data. Interesting way, all eight hypotheses has been resulted as consistent. Investor attention's negative effect on volatility as stimulating investors to take higher risk and differentiation in the rising and falling stock market were interesting and fully expected results that we mentioned under the headline of behavioral finance directly effects of random consistency, optimism and wishful thinking, representativeness.

Table 2.4 : Sicherman's hypothesis on investor attention.

| No. | Hypothesis | Result |
|-----|--|------------|
| 1 | Investor attention is higher in rising stock market compared falling markets for investors | Consistent |
| 2 | Investor attention decreases market volatility (ostrich effect) | Consistent |
| 3 | Investor attention increases with coverage of news on stocks | Consistent |
| 4 | Investor attention does not accompany to conditional trading due to other economic drivers | Consistent |
| 5 | Investor attention effects in higher in older ages investor (close to retirement) and rich investors | Consistent |
| 6 | Demographic patterns of household attention and conditional trading have been differentiated | Consistent |
| 7 | Ostrich effect stimulates investors to take higher risk | Consistent |
| 8 | Ostrich effect is not so meaningful in falling stock market | Consistent |

Da et al. (2011) examines 3000 stocks from NYSE and NASDAQ employing google SVI as a direct measure of investor attention and finds that SVI can able to predict stock returns within next two weeks especially for price sensitive low volume traded stock, and price pressure realizations come up with one year.

Dong and Wu (2020) employs eastmoney.com and use heat factor that presented in that websites to measure investor attention' s effects on stock prices. Chinese A share stocks has been analyzed with FamaMacbeth and following rolling analysis. According to analysis, heat factor is very useful in efficiency of the market and direct risk pricing factor of stocks. Investors are tend to be overflowed by information as far as they can do motivated from less efficient market structure.

Bondia et al. (2019) conduct study to contextualize pattern of individual investors investment decision on indian stock market as employing one to one interviews on the contrary of widespread method through mathematical models. After chosen similar investment experience and biased individual investors, the purpose and methodolgy of experiment has been detailly explained. Along 48 hours interview period, open ended questions has been asked and requested to exemplified over their real life experiences. Each interview has been recorded and interview transcripts have been shared to investors upon completion. As a result of open coding data analysis, social influence has been detected to main motivators to take a place on stock market. Investor' s behaviors have changed by experience and optimism is the outstanding behavioral factor.

2.2.2.2 Investor sentiment

Marginal satisfaction of investor from each unit of earning and marjinal disfavor from each unit of loss depends on investor' s sense of profit/loss, available prosperity and a few more objective & subjctive factors too. Leading theorician in behavioral pschology Daniel Kahneman, nobel prized at 2002, asserted that his trials has been showed that, mostly 3 dollars has been preferred when there are two option at stake; 100 % quaranteed three dollars and 80 % quaranteed four dollars. Whereas looking for expected returns respectively there dollars and three dollars and twenty cents, people does not make rational decisions (Rickards, 2016). In the life, each decision has the unique environment, and feelings at that moment of people too. Apart from there, If we make only one choice, which one is more rational to prefer ; 100 % quarantee 3 dollars or 80 % possible 4 dollars includes 20 % 0 dollars and 80 % 4 dollars. If you need money too, three dollars will be more meaningful independent of expected values. In the article "Exposition of a New Theory on the

Measurement of Risk” famed with St. Petersburg paradox, Bernoulli (1738)’ s first paragraph start with the opposition to expected value as perceived way by people as a receipt of decision making process that used real in life. Price and probability are not enough to estimate the price of any asset. Benefit of investor has been depended on special and unique conditions that he is in even if matter of facts are the same for anybody (Bernstein,2016). His approach starting to irrationality and investor sentiment.

Keynes (1936) is one of the first academician and believe and stress the importance of behavioral finance as describing it as investor sentiment. He believes that it is purely wrong to conclude as all fluctuation is result of irrational behavior. But He stressed that all decision from personal to economic or political is not result of explicit mathematical calculation too. In old times that advanced calculation is not available, people make choices from alternatives in their available capacity as using sentiment as their inner gut feeling. Many pricing theory assumes that all information in the market instantaneously reflected on prices when it goes public. Widely usage of internet and digitalization present very wide range of platforms that investors has been sharing their ideas and price expectations on prices. Message boards, yahoo finance, investing.com and twitter are widely used ones that includes monumental data to accumulate, analyze and use to measure investor sentiment. Especially in twitter (Url-1), people share, discuss their ideas about stocks, give a way their decision to manage their portfolios. It enables high advantage to emerging markets that we can assume less efficient market because of limited access of market data by some investors. 100 % certain analysis is not possible but give very important indications to follow up and grab to sense of behaviours that yield stock movements. In twitter, users use several implications to stress their ideas and feelings on stocks as using hashtags (#), at (@) and cashtags (\$) witin 280 character limitation. Any user can reach the related tweets just searching subjects with entering this characters. It also gives opportunity of analysis for using machine learning mechanism via denomination certain words as positive and negative. It will yield vectors that can be used as element to use prediciting stock trade volume, stock price, etc. Besides of it, stocktwits is the another specialized social platform widely used by investors that

used cashtag (\$) symbol before stock ticker (Url-2). The most widely used measure of investor sentiment is the bloomberg social velocity that employs data of these two platform database ; stocktwits and twitter, produce a company level sentiment scaled between -1 and +1. As working principle in the background, bloomberg' s company level sentiment is the weighted average of story level sentiment which is generated within news and tweets based on stock tickers. This story level sentiment has two components score and confidence. Score has three different category allots - 1,0 and +1 means negative, neutral and positive sentiment while confidence is ranged from 0 to 100 as probability of being negative, neutral and positive (Url-3). But, It gives only abnormalities and therefore we employ bloomberg news sentiment as the indicator of investor sentiment in our analysis base of widespread and robust mathematical machine learning base (Url-4) .

Uygur and Tas (2014) investigate investor attention effects on diverse economic sectors on of Istanbul Stock Exchange and present that investor sentiment mainly driven by noise trader has monumental effect on conditional volatility of different ISE index. Banking and industrial index appears as the mostly effected ones by investor sentiment. Regarding this sectors frontiers specification to market get into increase volatility in all index. It is stressed that highest foreign share nature of these industry make it appealing for noise traders to reach indormation and follow up this stock on different social media coverage and increse market efficiency for noise traders.

Nasseri et al. (2014) examine 2892 tweets belongs to 30 stocks in dow jones industrial average on Stocktweets, create four different machine learning algorithms to label signals from tweets as buy, hold or sell. One of there learning algoritms that measure investor sentiment, Bayes net classifier, has been succesfully appeared as having predictive power on stock returns.

Xu et al.(2019) stressed the importance of investor sentiment for predicting stock returns and build up a model as taking multi-source sentiment assuming has non lineer effect on stock return. In the Multi source sentiment analysis represented as several combination of internet index, technical index and market index, respectively feeds by data baidu.com, simple moving price of stock in certain period and a mixed

of trading volume and volatility for market index. According to result of analysis feeds by autoregression, statistical and machine learning mixed methodology, investor sentiment model MIDAS-SVR give meaningful and promising results to predict Shanghai and Shenzhen index returns.

Sun et al. (2018) employs Guba, which is a stock forum of noise traders expressed their opinions and comments, and presents a model mainly concern with investor sentiment relation with market condition; bullishness and bearish. The research shows positive correlation between Guba based sentiment and stock market bias, increase in bullishness via increase in higher activity in Guba within related chinese stock market index.

Tan and Tas (2018) disclose the abnormal google search volume index as direct measure of investor attention at Istanbul Stock exchange yield higher stock returns via short term price pressure.

2.3. Research Questions

Our motivation in to provide a methodology to investors not only statistically significant but also economically beneficial, works in real life into investment strategies. Researches shows that macroeconomic indicators are good but not sufficient indicators with itself to predict stock returns. In the first part of thesis, we analyzed several stock indexes of Turkey, important emerging market with the structure of less efficient compared to developed countries, with several macroeconomic indicators and looked for answers of rearch questions :

R.Q.1:Do macroeconomic indicators have material and significant effects on stock indexes ?

R.Q.2:Which macroeconomic indicators effect which indexes? Is there available any differentiation?

R.Q.3:What is the time lag of each indicators' effect on stock indexes?

R.Q.4:Does Investor attention turn into transaction on trade desk as buy or sell immediately, thereby Is it an important indicators to stock returns?

R.Q.5:Does investor sentiment turn into transaction on trade desk as buy or sell immediately, thereby Is it an important indicators to stock returns?

Taking into consideration of all literature research, we define a methodology that believed to give a meaningful result to us. The background mentality has been given at Figure 1.1.

Macroeconomic variables are the preliminary indicators that gives effects on stock returns while microeconomic variables like over-expected growth, operational profit, increase in market share, new merger & acquisition are eventual ones that gives overall performance of company after it realized. Even if it is very easy to measure macroeconomic variable' s effect considering time lag effect, microeconomic variables are not available in the single sources combined in a table. But, their results transform into action with investor attention and investor sentiment, in a combined way with behavioral finance, can be measured directly. In the second part of thesis, we employed investor attention via google SVI and created an investor attention independent variable (index SVI) based on top ten stock of each index regarding partial weight of these stocks in index. After that, we included this independent investor attention variable upon already created regression formulas with macroeconomic variables and tested their effect on stock returns. In the last part of thesis, we employed investor sentiment via bloomberg news sentiment and created an investor sentiment independent variable (index sentiment) based on top ten stock of each index regarding partial weight of these stocks in index. After that, we included this independent investor sentiment variable upon already created regression formulas with macroeconomic variables and investor attention (if feasible) and tested their effect on stock returns.

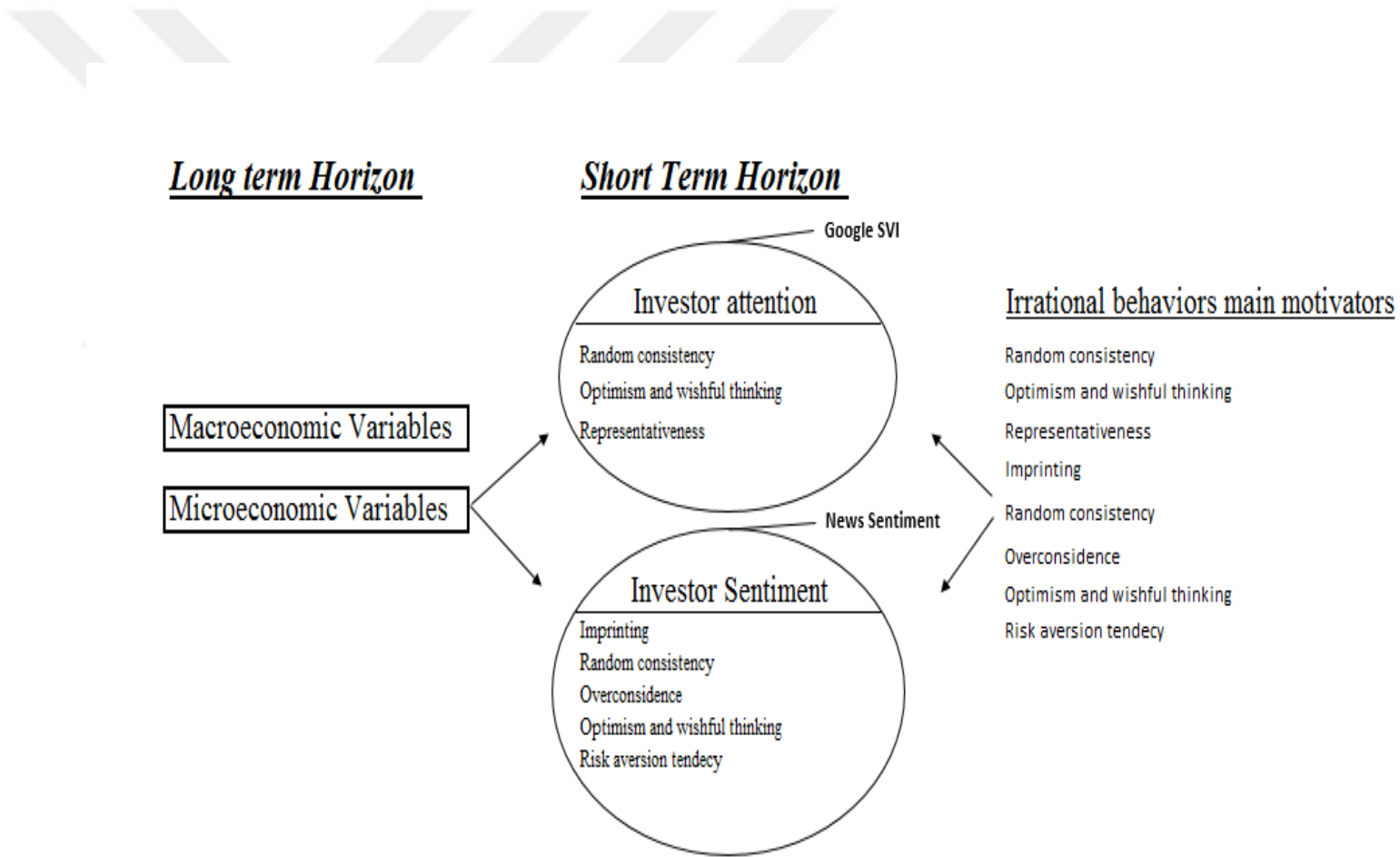


Figure 1.1 : The relationship between macroeconomic variables, investor attention and investor sentiment.

3. DATA AND METHODOLOGY

In the first part of thesis, we will examine macroeconomic variables and stock returns relations on turkish stock market using different category of index. We employed eight different macroeconomic indicators' monthly basis changes and respective index changes, looking for the answers of R.Q.1, R.Q.2 and R.Q.3 research questions.

After creating statistically representative regression formulas for each index with respective macroeconomic indicators, we included behavioral factors, intitially investor attention via google svi and looked for more representative formulation to stock return prediction. In the last phase, we employed second behavioral factor investor sentiment via bloomberg news sentiment and try to find statistically significant but also works in real life into investment strategies for Turkey Stock market.

Considering less developed market environment and mainly diriven by individual investors, Turkey stock market has been analyzed in our thesis. Moreover, The active experiences as individual investor in that market, we hope familiarity with the conequences.

3.1 Predicting Stock Returns on Borsa Istanbul Index with Macroeconomic Indicators

In the process of macroeconomic variables selection, producer price index, industrial production index, commercial banking funding rate, currency basket, gold price (ons), M2 money supply of TCB, Brent oil (USD), Copper (USD) has been taken into consideration for possible indicators of stock returns. 74 months between July 2012 and August 2018 has been analyzed to prevent any black swan effect and availability of data retrospectively from Turkey economy.

Linear regression has been employed as methodology and macroeconomic indicators has been assumed as independent x variables to use predict dependent y variables, BIST 100 stock index. To analyze availability of differentiation on direction and effects of

macroeconomic variables, dependent y variables has been analyzed separately as BIST 100 total, BIST 100 service, BIST 100 financial, BIST 100 industrial, BIST 100 technology index.

The mentality behind the selection of macroeconomic indicators has been summarized at below.

Producer price index (PPI) is one of the important indicator of consumer demand especially in emerging economies high relatively high inflation which has been pushed by demand. Our examined Turkey stock market companies purchased a big portion of raw materials used in production or direct commercial goods as import from other countries. Any cost increase or decreased in these production ingredients has direct effect on companies operating result as increase/decrease in operating profit in case of fixed sales price or changing demand environment and stock valuation in their balance sheet. From this aspect, Producer price index can be assumed as a direct proxy of companies' operating performance and taking into consideration as stock returns indicator.

Industrial production index (IPI) has been assumed as preliminary indicator for economic activity at the manufacturing industry. If we think relation between consumption and manufacturing as pull & push system, consumption demand on the market pulls the manufacturing to enable enough supply. From this aspect, industrial production index can be assumed as a direct proxy of manufacturing companies' operating performance and taking into consideration as stock returns indicator.

Commercial banking funding rate (CBFR), financing of companies has been applied mainly three ways. Own equity, financial debts to financial institutions or issuance of debt obligation to public, positive contribution of negative cash cycle means excessively covering account receivable and stock with account payable. Even if three methods have been employed in different combinations, especially in emerging markets, has insufficient financing sources, financial needs have been met via commercial banks sources syndication credits derived on the base of mostly EUR and slightly USD. As bearing relatively high portion of balance sheet size and cost in their statutory P&L, commercial banking funding rate has important factor companies' profitability and growth. From this aspect, commercial banking funding rate is assumed as a direct proxy

of companies operating performance and taking into consideration as stock returns indicator.

Currency basket (CB), independently from commercial scope of company neither importer from the side of operational ingredients; raw materials, consumables or exporter of final product, all company in emerging economy affected from currency rates enormously. Considering Turkey's total export consists of 48 % portion to European union countries, EUR/TRY rate has the biggest factor of it. Moreover, being reserve currency status, huge amount raw material, commodity and consumables has been priced with American dollar. For an exporter, increase of currency rates means additional profit and increase of market penetration in case of keeping same selling price while loss of profit and market share loss for importers. As taking equal importance of USD and EUR in Turkey stock market companies' operation, we took currency basket as a direct proxy of companies' operating performance and taking into consideration as stock returns indicator.

Gold price (G), from the ancient ages to today, gold has been denominated as the one real money and all economic models has been formed upon it until 1971, Bretton woods. Even if we do not have certain information why the first human deifies a value to gold and not silver, palladium or platinum as money in world economy, it makes stabilizing role in countries commerce. In the classic gold ages, gold has the role to keep balance of trade and yield global affluence. Even if paper golds availability and non-application of equilibrium between monetary supply and gold reserves, risky times gold is demanded the safest investment instruments and can move opposite direction to stock prices. From this aspect, gold price can be assumed as a direct proxy of risk perception and taking into consideration as stock returns indicator.

M2 money supply of TCM (M2), money supply is the main indicator of economic activity money volume that all markets make that operation with sharing of that it. From the mathematical perspective,

M2 Money supply = money supply of central bank + coin supply of government – cash in bank + deposit account + saving account

In the expansionary monetary policy times, money supply has been increased, in case of transforming into consumption; it creates inflation and invigorates the economic activity. On the contrary, balance sheet of central banks shrunk, interest rates increase and economic activity may slow down. From this aspect, M2 money supply can be assumed as a direct proxy of economic activity and taking into consideration as stock returns indicator.

Brent oil USD (BO), the world industry is based on oil as energy resource and transportation vehicle main consumption material for almost one hundred years. Widespread usage of it, appeared itself main cost indicators of many industries directly or indirectly. From this aspect, brent oil price can be assumed as a direct proxy of profitability level of companies and taking into consideration as stock returns indicator.

Copper USD (C) is the most widely used commodity in every industry and price movements are generally tracked in line of demand. Copper price increased at the times that high economic activity with positively correlated manufacturing capacity usage, declines low economic activity times. It gives preliminary indication about economic activity and has denominated as Dr. Copper resulted from that specification. From this aspect, copper price can be assumed as a direct proxy of economic activity, manufacturing companies' capacity usage, and taking into consideration as stock returns indicator.

In our analysis Microsoft excel has been employed includes solver, power bi and statistical data analysis packages because of desire to follow up each process of data analysis.

Time Scope

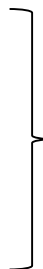
July 2012 – August 2018



Minimizing outlier conditions effect has been considered in the process of date interval preference.

Dependent Variables:

- BIST 100 Total
- BIST 100 Service
- BIST 100 Financial
- BIST 100 Industrial
- BIST 100 Technology



Changes at monthly basis (%)

Independent Variables:

| | |
|------------------------------|--------------------------------|
| Producer price index | } Changes at monthly basis (%) |
| Industrial production index | |
| Commercial bank funding rate | |
| Currency basket | |
| Gold price (ons) | |
| M2 money supply of TCB | |
| Brent oil (USD) | |
| Copper (USD) | |

Database of TUIK and TCMB has been used (Url-5 & Url-6).

Macroeconomic indicators and BIST index has been given as change in percentage to previous data to make stable analysis over same denomination. It is shown at the below Table 3.1 and Table 3.2.

Table 3.1 : Time series denomination of independent variables.

| Time Series Denomination | |
|---|--------------------------------------|
| $\Delta PPI = (PPI (t) / PPI (t-1))-1$ | Producer price index change |
| $\Delta IPI = (IPI (t) / PPI (t-1))-1$ | Industrial production index change |
| $\Delta CBF\!R = (CBFR (t) / CBF\!R (t-1))-1$ | Commercial banks funding rate change |
| $\Delta CB = (CB (t) / CB (t-1))-1$ | Currency basket change |
| $\Delta G = (G (t) / G (t-1))-1$ | Gold price ons change |
| $\Delta M2 = (M2 (t) / M2 (t-1))-1$ | M2 Money Supply change |
| $\Delta BO = (BO (t) / BO (t-1))-1$ | Brent oil (USD) change |
| $\Delta C = (C (t) / C (t-1))-1$ | Copper price (USD) change |

Table 3.2 : Time series denomination of dependent variables.

| Time Series Denomination | |
|--|----------------------------------|
| $\Delta BIST\ 100\ Total = BIST\ 100\ Total (t) / BIST\ 100\ Total (t-1)-1$ | BIST 100 Total index change |
| $\Delta BIST\ 100\ Service = BIST\ 100\ Service (t) / BIST\ 100\ Service (t-1)-1$ | BIST 100 Service index change |
| $\Delta BIST\ 100\ Financial = BIST\ 100\ Financial (t) / BIST\ 100\ Financial (t-1)-1$ | BIST 100 Financial index change |
| $\Delta BIST\ 100\ Industrial = BIST\ 100\ Industrial (t) / BIST\ 100\ Industrial (t-1)-1$ | BIST 100 Industrial index change |
| $\Delta BIST\ 100\ Technology = BIST\ 100\ Techn. (t) / BIST\ 100\ Techn. (t-1)-1$ | BIST 100 Technology index change |

In the Initial data conformity test process, Independent X variables (Macroeconomic indicators) has been analyzed from the aspect of inter correlation to prevent similar indicators in our analysis together. According to result, there are not available meaningful correlation between them ($<0,7$) as seen from below Table 3.3

Table 3.3 : Macroeconomic indicators correlation table.

| <i>Correlation Analysis</i> | ΔPPI | ΔIPI | $\Delta CBF R$ | ΔCB | ΔG | $\Delta M2$ | ΔBO | ΔC |
|-----------------------------|--------------|--------------|----------------|-------------|------------|-------------|-------------|------------|
| ΔPPI | 1,00 | | | | | | | |
| ΔIPI | 0,18 | 1,00 | | | | | | |
| $\Delta CBF R$ | 0,14 | 0,04 | 1,00 | | | | | |
| ΔCB | 0,44 | 0,10 | 0,07 | 1,00 | | | | |
| ΔG | -0,01 | -0,03 | 0,01 | -0,32 | 1,00 | | | |
| $\Delta M2$ | 0,41 | 0,21 | -0,05 | 0,68 | -0,02 | 1,00 | | |
| ΔBO | 0,04 | 0,08 | 0,02 | 0,00 | 0,07 | 0,00 | 1,00 | |
| ΔC | -0,07 | 0,07 | -0,04 | -0,02 | -0,03 | -0,11 | 0,15 | 1,00 |

Lag test (significance: 95 %) has been applied to dependent y variables for each index from BIST 100 total to BIST 100 technology to test any effect of previous dependent variable to sequent one. There were no any meaningful explanatory effects within themselves as seen table 3.4 at below

Table 3.4 : BIST 100 Total lag test result.

| <i>Regression Statistics</i> | |
|------------------------------|--------|
| Multiple R | 0,419 |
| R Square | 0,176 |
| Adjusted R Square | -0,006 |
| Standard Error | 0,041 |
| Observations | 73 |

| <i>ANOVA</i> | | | | | | |
|--------------|-----------|-----------|-----------|----------|-----------------------|--|
| | <i>df</i> | <i>SS</i> | <i>MS</i> | <i>F</i> | <i>Significance F</i> | |
| Regression | 13 | 0,022 | 0,002 | 1,066 | 0,405 | |
| Residual | 60 | 0,102 | 0,002 | | | |
| Total | 73 | 0,124 | | | | |

| | <i>Coefficients</i> | <i>Standard Error</i> | <i>t Stat</i> | <i>P-value</i> | <i>Lower 95%</i> | <i>Upper 95%</i> | <i>Lower 95,0%</i> | <i>Upper 95,0%</i> |
|-------------------|---------------------|-----------------------|---------------|----------------|------------------|------------------|--------------------|--------------------|
| Intercept | -0,003 | 0,017 | -0,157 | 0,876 | -0,037 | 0,032 | -0,037 | 0,032 |
| 07 | 0,014 | 0,024 | 0,572 | 0,569 | -0,035 | 0,063 | -0,035 | 0,063 |
| 08 | -0,017 | 0,023 | -0,753 | 0,454 | -0,064 | 0,029 | -0,064 | 0,029 |
| 09 | 0,009 | 0,025 | 0,372 | 0,711 | -0,040 | 0,058 | -0,040 | 0,058 |
| 10 | 0,036 | 0,024 | 1,500 | 0,139 | -0,012 | 0,084 | -0,012 | 0,084 |
| 11 | 0,003 | 0,024 | 0,112 | 0,911 | -0,045 | 0,050 | -0,045 | 0,050 |
| 12 | 0,031 | 0,024 | 1,288 | 0,203 | -0,017 | 0,079 | -0,017 | 0,079 |
| 01 | 0,038 | 0,024 | 1,610 | 0,113 | -0,009 | 0,086 | -0,009 | 0,086 |
| 02 | 0,015 | 0,024 | 0,634 | 0,528 | -0,033 | 0,063 | -0,033 | 0,063 |
| 03 | 0,010 | 0,024 | 0,420 | 0,676 | -0,038 | 0,058 | -0,038 | 0,058 |
| 04 | 0,036 | 0,024 | 1,485 | 0,143 | -0,012 | 0,084 | -0,012 | 0,084 |
| 05 | 0,000 | 0,000 | 65535,000 | | 0,000 | 0,000 | 0,000 | 0,000 |
| 06 | -0,002 | 0,024 | -0,087 | | -0,051 | 0,046 | -0,051 | 0,046 |
| LagBIST 100 Total | 0,024 | 0,130 | 0,187 | 0,853 | -0,235 | 0,284 | -0,235 | 0,284 |

To prevent seasonality effect on macroeconomic variables, seasonality has been removed over twelve months' average values for macroeconomic indicators.

At the end of the first part of thesis, we aim to create regression formulas with highest level of explanatory power to stock returns. It is expected that all macroeconomic variables will not available explanatory for each index returns. Moreover, it is expected that there will be time lag between some macroeconomic indicators effects on index returns. So, in our methodology, we will examine each index with all seven macroeconomic indicators' last 4 month changes separately and will describe separate relationship with each macroeconomic variable. After that we will combine this relationship and form initial regression formulation to find final regression formula that has the highest explanatory power under 95 % significance level. At the final stage, we will make iterations on initial regression in terms of changing months of macroeconomic variables and will find the highest explanatory power regression formula.

$$\underline{BIST\ 100\ Index\ Change\ (t)} = a + (b_0 * \text{Industrial Production Index Change (t-n1)}) + (b_1 * \text{Commercial Bank Funding Rate Change (t-n2)}) + (b_2 * \text{Currency Basket Change (t-n3)}) + (b_3 * \text{M2 Money Supply Change (t-n4)}) + (b_4 * \text{Copper Price Change (t-n5)})$$

Where;

b0, b1, b2, b3, b4, b5, b6, b7 is between -1 and 1.

n1, n2, n3, n4, n5, n6, n7 is between -4 and 0.

t is the month gives change in dependent variable from July 2012 to August 2018

3.1.1 BIST 100 total

As we explained at above methodology, for each macroeconomic variable, relationship will be defined separately as taking into consideration macroeconomic variables has deferred effect on index returns. As a first example, we can able to see at below Table 3.5 includes commercial bank funding rate change and BIST 100 index change. We run the regression at four different times as considering commercial bank funding rate can effect stock returns with time lag. The most explanatory power as the lowest P value one is 13,6 % at second one, seen Table 3.6. Commercial funding rate change at the month

may have the explanatory power on t+2 month BIST 100 total index change depends on the final model enable it to make feasible variable.

Table 3.5 : BIST 100 total – Commercial bank funding rate regression test.

| Independent X variable | | | Dependent Y variable | | | | | |
|------------------------|---------|---------------------------------|----------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------|
| Month | Term | Commercial Banking Funding Rate | BIST 100 TOTAL | Lag Bist 100 total (t+1) | Lag Bist 100 total (t+2) | Lag Bist 100 total (t+3) | Lag Bist 100 total (t+4) | |
| 07 | 2013-07 | -0,23 | 0,008 | -0,087 | 0,095 | 0,058 | 0,058 | 0,016 |
| 08 | 2013-08 | 0,08 | -0,087 | 0,095 | 0,058 | -0,115 | -0,005 | -0,115 |
| 09 | 2013-09 | 0,20 | 0,095 | 0,058 | 0,016 | -0,005 | 0,039 | -0,005 |
| 10 | 2013-10 | -0,11 | 0,058 | 0,016 | -0,115 | -0,005 | 0,039 | 0,039 |
| 11 | 2013-11 | -0,01 | 0,016 | -0,115 | -0,005 | -0,021 | -0,021 | -0,021 |
| 12 | 2013-12 | 0,08 | -0,115 | -0,005 | 0,039 | 0,075 | 0,075 | 0,075 |
| 01 | 2014-01 | 0,55 | -0,005 | 0,039 | -0,021 | 0,036 | 0,036 | 0,036 |
| 02 | 2014-02 | 0,10 | 0,039 | -0,021 | 0,075 | 0,010 | 0,010 | 0,024 |
| 03 | 2014-03 | -0,06 | -0,021 | 0,075 | 0,036 | 0,008 | 0,008 | 0,010 |
| 04 | 2014-04 | 0,15 | 0,075 | 0,036 | 0,024 | 0,010 | 0,010 | 0,008 |
| 05 | 2014-05 | 0,21 | 0,036 | 0,024 | 0,010 | 0,008 | 0,008 | -0,025 |
| 06 | 2014-06 | -0,28 | 0,024 | 0,010 | 0,008 | -0,025 | 0,033 | 0,033 |
| 07 | 2014-07 | 0,08 | 0,010 | 0,008 | -0,025 | 0,033 | 0,033 | 0,034 |
| 08 | 2014-08 | -0,12 | 0,008 | -0,025 | 0,033 | 0,034 | 0,034 | 0,036 |
| 09 | 2014-09 | 0,20 | -0,025 | 0,033 | 0,034 | 0,036 | 0,036 | 0,048 |
| 10 | 2014-10 | 0,16 | 0,033 | 0,034 | 0,036 | 0,048 | 0,048 | -0,006 |

Table 3.6 : BIST 100 total – Commercial bank funding rate regression test result.

| Regression Statistics | |
|-----------------------|-------|
| Multiple R | 0,195 |
| R Square | 0,038 |
| Adjusted R Square | 0,021 |
| Standard Error | 0,041 |
| Observations | 60 |

| ANOVA | | | | | |
|------------|----|-------|-------|-------|----------------|
| | df | SS | MS | F | Significance F |
| Regression | 1 | 0,004 | 0,004 | 2,291 | 0,136 |
| Residual | 58 | 0,100 | 0,002 | | |
| Total | 59 | 0,104 | | | |

| | Coefficients | Standard Error | t Stat | P-value | Lower 95% | Upper 95% | Lower 95,0% | Upper 95,0% |
|-------------------------------|--------------|----------------|--------|---------|-----------|-----------|-------------|-------------|
| Intercept | 0,014 | 0,005 | 2,619 | 0,011 | 0,003 | 0,025 | 0,003 | 0,025 |
| Commercial Banks Funding Rate | -0,032 | 0,021 | -1,514 | 0,136 | -0,074 | 0,010 | -0,074 | 0,010 |

After applying same methodology for all macroeconomic variables separately, we create initial regression formula as just indicating significant macroeconomic variables and time lag effect over period. As we see at below initial regression formula producer price index change, gold price (ONS) change and brent oil price change does not have any effect on BIST 100 total change at any period as examined four-month period.

$$\underline{BIST\ 100\ total\ change\ (t)} = a + (b_0 * \text{industrial production index change (t-2)}) + (b_1 * \text{commercial bank funding rate change (t-2)}) + (b_2 * \text{currency basket change (t)}) + (b_3 * \text{M2 money supply change (t)}) + (b_4 * \text{copper price change (t-1)})$$

After composing initial regressions over one to one examination of BIST 100 total index change with macroeconomic variables changes, we will try to find final regression as running above initial formulation and then increase iterations as removing less explanatory ones to maximize total explanatory power r square.

In the regression of first initial formulation, we derived that Commercial bank funding rate and copper price show irrelevancy with taking together all in initial regression as seen at the Table 3.7

Table 3.7 : BIST 100 total – macroeconomic variables initial regression result.

| Regression Statistics | |
|-----------------------|-------|
| Multiple R | 0,578 |
| R Square | 0,334 |
| Adjusted R Square | 0,273 |
| Standard Error | 0,036 |
| Observations | 60 |

| ANOVA | | | | | |
|------------|----|-------|-------|-------|----------------|
| | df | SS | MS | F | Significance F |
| Regression | 5 | 0,035 | 0,007 | 5,426 | 0,000 |
| Residual | 54 | 0,069 | 0,001 | | |
| Total | 59 | 0,104 | | | |

| | Coefficients | Standard Error | t Stat | P-value | Lower 95% | Upper 95% | Lower 95,0% | Upper 95,0% |
|----------------------------------|--------------|----------------|--------|---------|-----------|-----------|-------------|-------------|
| Intercept | 0,021 | 0,006 | 3,469 | 0,001 | 0,009 | 0,033 | 0,009 | 0,033 |
| INDUSTRIAL PRODUCTION INDEX | 0,016 | 0,007 | 2,386 | 0,021 | 0,003 | 0,029 | 0,003 | 0,029 |
| Banka Ticari Kredi Faiz oranları | 0,037 | 0,025 | 1,448 | 0,153 | -0,014 | 0,087 | -0,014 | 0,087 |
| Sepet Kur | -0,206 | 0,104 | -1,973 | 0,054 | -0,415 | 0,003 | -0,415 | 0,003 |
| M2 Para Arzı | -0,603 | 0,277 | -2,180 | 0,034 | -1,159 | -0,048 | -1,159 | -0,048 |
| Bakır Fiyatı | 0,001 | 0,004 | 0,127 | 0,899 | -0,008 | 0,009 | -0,008 | 0,009 |

After removing copper at our final regression, we are still show irrelevancy for commercial funding rate too and created final regression formula that able to explain 33% of BIST 100 total index change as seen at the below Table 3.8

$$\underline{BIST\ 100\ total\ change\ (t)} = 0,021 + (0,16 * \text{industrial production index change (t-2)}) - (0,21 * \text{currency basket change (t)}) + (-0,6 * \text{M2 money supply change (t)}) + E$$

Table 3.8 : BIST 100 total – macroeconomic variables final regression result.

| <i>Regression Statistics</i> | |
|------------------------------|-------|
| Multiple R | 0,578 |
| R Square | 0,334 |
| Adjusted R Square | 0,286 |
| Standard Error | 0,035 |
| Observations | 60 |

| ANOVA | | | | | |
|------------|-----------|-----------|-----------|----------|-----------------------|
| | <i>df</i> | <i>SS</i> | <i>MS</i> | <i>F</i> | <i>Significance F</i> |
| Regression | 4 | 0,034603 | 0,008651 | 6,901566 | 0,000141352 |
| Residual | 55 | 0,068939 | 0,001253 | | |
| Total | 59 | 0,103541 | | | |

| | <i>Coefficient</i> | <i>Standard Err</i> | <i>t Stat</i> | <i>P-value</i> | <i>Lower 95%</i> | <i>Upper 95%</i> | <i>Lower 95,0%</i> | <i>Upper 95,0%</i> |
|----------------------------------|--------------------|---------------------|---------------|----------------|------------------|------------------|--------------------|--------------------|
| Intercept | 0,020997 | 0,005901 | 3,557914 | 0,001 | 0,009169958 | 0,032823179 | 0,009169958 | 0,032823179 |
| INDUSTRIAL PRODUCTION INDEX | 0,015913 | 0,006399 | 2,486647 | 0,016 | 0,003088311 | 0,028737231 | 0,003088311 | 0,028737231 |
| Banka Ticari Kredi Faiz oranları | 0,035749 | 0,024153 | 1,48013 | 0,145 | -0,012653886 | 0,08415185 | -0,012653886 | 0,08415185 |
| Sepet Kur | -0,20734 | 0,102588 | -2,02111 | 0,048 | -0,412931183 | -0,001750874 | -0,412931183 | -0,001750874 |
| M2 Para Arzi | -0,60554 | 0,27392 | -2,21066 | 0,031 | -1,154492593 | -0,056595932 | -1,154492593 | -0,056595932 |

3.1.2 BIST 100 service

As we give detailed explanations for BIST 100 total index, initial regression formula has been created as just indicating significant macroeconomic variables and time lag effect over period too for BIST 100 service index. As we see at below initial regression formula producer price index change, gold price (ONS) change do not have any effect on BIST 100 service change at any period as examined four-month period.

$$\underline{BIST\ 100\ service\ change\ (t)} = a + (b_0 * \text{industrial production index change (t-3)}) + (b_1 * \text{commercial bank funding rate change (t-1)}) + (b_2 * \text{currency basket change (t)}) + (b_3 * \text{Brent oil change (t-1)}) + (b_4 * \text{M2 money supply change (t)}) + (b_5 * \text{copper price change (t-1)})$$

After composing initial regressions over one to one examination of Bist 100 service index change with macroeconomic variables changes, we will try to find final regression as running above initial formulation and then increase iterations as removing less explanatory ones to maximize total explanatory power r square.

After five consecutive iterations we reach the final regression that able to explain 24% of BIST 100 service index change.

$$\underline{BIST\ 100\ Service\ change\ (t)} = 0,017 + (0,055 * \text{commercial bank funding rate change (t-1)}) + (-0,78 * \text{M2 money supply change (t)}) + E$$

3.1.3 BIST 100 Financial

Initial regression formula has been created as just indicating significant macroeconomic variables and time lag effect over period too for BIST 100 financial index. As we see at below initial regression formula producer price index change, copper price, commercial bank funding rate and Brent oil price change do not have any effect on BIST 100 financial change at any period as examined four-month period.

$$\underline{BIST\ 100\ financial\ change\ (t)} = a + (b_0 * \text{industrial production index change (t-3)}) + (b_1 * \text{currency basket change (t)}) + (b_3 * \text{gold price (ons) (t)}) + (b_4 * \text{M2 money supply change (t)})$$

After composing initial regressions over one to one examination of Bist 100 financial index change with macroeconomic variables changes, we will try to find final regression as running above initial formulation and then increase iterations as removing less explanatory ones to maximize total explanatory power r^2 .

After two consecutive iterations we reach the final regression that able to explain 30 % of BIST 100 service index change.

$$\underline{BIST\ 100\ financial\ change\ (t)} = 0,016 + (0,017 * \text{industrial production index change (t-3)}) + (0,13 * \text{gold price (ons) (t)}) + (-1,00 * \text{M2 money supply change (t)}) + E$$

3.1.4 BIST 100 Industrial

Initial regression formula has been created as just indicating significant macroeconomic variables and time lag effect over period too for BIST 100 industrial index. As we see at below initial regression formula only industrial producer index and gold price changes have effect on BIST 100 industrial change.

$$\underline{BIST\ 100\ industrial\ change\ (t)} = a + (b_0 * \text{industrial production index change (t-3)}) + (b_3 * \text{gold price (ons) (t)})$$

After composing initial regressions over one to one examination of Bist 100 industrial index change with macroeconomic variables changes, we will try to find final regression as running above initial formulation and then increase iterations as removing less explanatory ones to maximize total explanatory power r square.

Because of limited representative variable availability only with one iteration we reach the final regression that able to explain 12 % of BIST 100 industrial index change.

$$\underline{BIST\ 100\ industrial\ change\ (t)} = 0,012 + (0,017 * \text{industrial production index change (t-3)}) + (0,09 * \text{gold price (ons) (t)}) + E$$

3.1.5 BIST 100 Technology

Initial regression formula has been created as just indicating significant macroeconomic variables and time lag effect over period too for BIST 100 technology index. As we see at below initial regression formula producer price index change, copper price, commercial bank funding rate and Brent oil price change do not have any effect on BIST 100 financial change at any period as examined four-month period.

$$\underline{BIST\ 100\ technology\ change\ (t)} = a + (b_0 * \text{producer price index (t)}) + (b_1 * \text{commercial bank funding rate change (t-1)}) + (b_2 * \text{currency basket change (t)}) + (b_3 * \text{M2 money supply change (t)}) + (b_4 * \text{copper price change (t-1)})$$

After composing initial regressions over one to one examination of Bist 100 technology index change with macroeconomic variables changes, we will try to find final regression as running above initial formulation and then increase iterations as removing less explanatory ones to maximize total explanatory power r square.

After four consecutive iterations we reach the final regression that able to explain 24 % of BIST 100 technology index change.

$$\underline{BIST\ 100\ technology\ change\ (t)} = 0,031 + (0,07 * \text{commercial bank funding rate change (t-1)}) + (-0,495 * \text{currency basket change (t)}) + E$$

Summarizing result in the Table 3.9 at below;

* 5 macroeconomic indicators have material and powerful effect on BIST 100 index returns at 95 % significance level.

* Producer Price Index, Brent Oil (USD) and Copper (USD) price level change has no material and powerful effect on examined BIST 100 indexes at 95 % significance level.

* M2 Money Supply of Central Bank of Turkey, Currency Basket and Gold Price are the fastest reactor for BIST 100 index change. That three macroeconomic indicator effects BIST 100 indexes as soon as they have been declared.

* Effects on Industrial Production Index on BIST 100 indexes has been realized with at least two months' time lag.

Table 3.9 : BIST 100 – macroeconomic variables final regression table.

| | Δ BIST 100 | Δ BIST 100 | Δ BIST 100 | Δ BIST 100 | Δ BIST 100 |
|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| | TOTAL | SERVICE | FINANCIAL | INDUSTRIAL | TECHNOLOGY |
| t Δ IPI | | | | | |
| t-1 Δ IPI | | | | | |
| t-2 Δ IPI | (+) | | | | |
| t-3 Δ IPI | | | (+) | (+) | |
| t Δ CBFR | | | | | |
| t-1 Δ CBFR | | (+) | | | (+) |
| t-2 Δ CBFR | | | | | |
| t-3 Δ CBFR | | | | | |
| t Δ CB | (-) | | | | (-) |
| t-1 Δ CB | | | | | |
| t-2 Δ CB | | | | | |
| t-3 Δ CB | | | | | |
| t Δ G | | | (+) | (+) | |
| t-1 Δ G | | | | | |
| t-2 Δ G | | | | | |
| t-3 Δ G | | | | | |
| t Δ M2 | (-) | (-) | (-) | | |
| t-1 Δ M2 | | | | | |
| t-2 Δ M2 | | | | | |
| t-3 Δ M2 | | | | | |
| R Square | 33,40% | 23,60% | 30,40% | 12,20% | 23,90% |

* M2 Money Supply of Central Bank of Turkey and Currency Basket changes have in negative way relationship with BIST 100 index returns.

* Industrial Production Index, Gold Price and Commercial Bank Funding Rates have positive relationship with BIST 100 index returns.

* Our final regressions R2 values indicates that micro analysis factors are monumental effect on investor decision too besides of macroeconomic indicators.

3.2 Predicting Stock Returns on Borsa Istanbul Index with Macroeconomic Indicators and Google SVI

In the first part of thesis producer price index, industrial production index, commercial banking funding rate, currency basket, gold price (ons), M2 money supply of TCB, Brent oil (USD), Copper (USD) has been taken into consideration as possible macroeconomic variables effects stock return at BIST 100 total, BIST 100 service, BIST 100 financial, BIST 100 industrial, BIST 100 technology index. Upon detail statistical analysis, we created regression formulas for each index, explains 12,20 % to 33,40 % variations on index returns. At this phase of thesis, we will use the google search volume index to measure investor attention within same period between July 2012 and August 2018 at monthly basis and try to implement available regression formulas as increasing explanatory power. Investor attention has been extracted by using top 10 stock ticker in that BIST index and created one single investor attention independent variable using relative weight on the index (Url-7). Change to previous month of investor attention variable has been taken into consideration as independent variable and included into regressions. Relative weight of top 10 stock of related BIST index has been given at below Table 3.10, Table 3.11, Table 3.12, Table 3.13, Table 3.14

Table 3.10 : Relative weights of top ten stock of BIST 100 total.

| Stock Ticker | Equity Name | Total number of shares | Free Float Ratio | BIST 100 Total |
|---------------------------------------|--------------------|-------------------------------|-------------------------|-----------------------|
| AKBNK.E | AKBANK | 52.000.000.000.000 | 52,00% | 9,1% |
| ASELS.E | ASELSAN | 11.400.000.000.000 | 26,00% | 4,2% |
| BIMAS.E | BIM MAGAZALAR | 6.072.000.000.000 | 60,00% | 11,0% |
| EREGL.E | EREGLI DEMIR CELIK | 35.000.000.000.000 | 48,00% | 7,6% |
| GARAN.E | GARANTI BANKASI | 42.000.000.000.000 | 48,00% | 9,9% |
| ISCTR.E | IS BANKASI (C) | 44.999.700.000.000 | 31,00% | 4,0% |
| KCHOL.E | KOC HOLDING | 25.358.980.500.000 | 22,00% | 4,5% |
| SAHOL.E | SABANCI HOLDING | 20.404.039.310.000 | 44,00% | 4,1% |
| TCELL.E | TURKCELL | 22.000.000.000.000 | 49,00% | 8,0% |
| TUPRS.E | TUPRAS | 2.504.192.000.000 | 49,00% | 5,6% |
| Relative Total weight to index | | | | 68,05% |

Table 3.11 : Relative weights of top ten stock of BIST 100 service.

| Stock Ticker | Equity Name | Total number of shares | Free Float Ratio | BIST 100 Service |
|---------------------------------------|--------------------|-------------------------------|-------------------------|-------------------------|
| BIMAS.E | BIM MAGAZALAR | 6.072.000.000.000 | 60,00% | 33,9% |
| ENJSA.E | ENERJISA ENERJI | 11.810.689.671.200 | 20,00% | 3,0% |
| ENKAIE.E | ENKA INSAAT | 50.000.000.000.000 | 12,00% | 6,9% |
| MAVLE | MAVI GIYIM | 496.570.000.000 | 73,00% | 2,3% |
| MGROS.E | MIGROS TICARET | 1.810.542.330.000 | 36,00% | 2,7% |
| PGSUS.E | PEGASUS | 1.022.997.070.000 | 36,00% | 2,3% |
| SOKME.E | SOK MARK. TIC. | 6.119.285.710.000 | 36,00% | 3,8% |
| TCELL.E | TURKCELL | 22.000.000.000.000 | 49,00% | 24,7% |
| THYAO.E | TURK HAVA YOLLARI | 13.800.000.000.000 | 50,00% | 11,6% |
| TTKOM.E | TURK TELEKOM | 35.000.000.000.000 | 13,00% | 5,7% |
| Relative Total weight to index | | | | 96,94% |

Table 3.12 : Relative weights of top ten stock of BIST 100 financial.

| Stock Ticker | Equity Name | Total number of shares | Free Float Ratio | BIST 100 Financial |
|---------------------------------------|--------------------|-------------------------------|-------------------------|---------------------------|
| AKBNK.E | AKBANK | 52.000.000.000.000 | 52,00% | 19,3% |
| GARAN.E | GARANTI BANKASI | 42.000.000.000.000 | 48,00% | 20,9% |
| HALKB.E | T. HALK BANKASI | 12.500.000.000.000 | 49,00% | 3,9% |
| ISCTR.E | IS BANKASI (C) | 44.999.700.000.000 | 31,00% | 8,4% |
| KCHOLE | KOC HOLDING | 25.358.980.500.000 | 22,00% | 9,6% |
| SAHOLE | SABANCI HOLDING | 20.404.039.310.000 | 44,00% | 8,6% |
| SISE.E | SISE CAM | 22.500.000.000.000 | 34,00% | 4,0% |
| TAVHLE | TAV | 3.632.812.500.000 | 40,00% | 3,1% |
| VAKBN.E | VAKIFLAR BANKASI | 25.000.000.000.000 | 25,00% | 3,7% |
| YKBNK.E | YAPI VE KREDI B. | 84.470.512.840.000 | 30,00% | 6,1% |
| Relative Total weight to index | | | | 87,65% |

Table 3.13 : Relative weights of top ten stock of BIST 100 industrial.

| Stock Ticker | Equity Name | Total number of share | Free Float Ratio | BIST 100 Industrial |
|---------------------------------------|--------------------|------------------------------|-------------------------|----------------------------|
| AEFES.E | ANADOLU EFES | 5.921.052.630.000 | 32,00% | 22,7% |
| ARCLK.E | ARCELIK | 6.757.282.050.000 | 25,00% | 16,7% |
| CCOLA.E | COCA COLA ICE. | 2.543.707.820.000 | 25,00% | 5,9% |
| EREGL.E | EREGLI DEM.CEL. | 35.000.000.000.000 | 48,00% | 5,6% |
| FROTO.E | FORD OTOSAN | 3.509.100.000.000 | 18,00% | 5,1% |
| KOZAL.E | KOZA ALTIN | 1.525.000.000.000 | 29,00% | 4,9% |
| PETKM.E | PETKIM | 21.120.000.000.000 | 44,00% | 4,7% |
| SODA.E | SODA SANAYII | 10.000.000.000.000 | 39,00% | 4,1% |
| TUPRS.E | TUPRAS | 2.504.192.000.000 | 49,00% | 4,0% |
| ULKER.E | ULKER BISKUVI | 3.420.000.000.000 | 39,00% | 3,6% |
| Relative Total weight to index | | | | 77,35% |

Table 3.14 : Relative weights of top ten stock of BIST 100 technology.

| Stock Ticker | Equity Name | Total number of share | Free Float Ratio | BIST 100 Technology |
|---------------------------------------|--------------------|------------------------------|-------------------------|----------------------------|
| ALCTL.E | ALCATEL LUCENT | 387.007.720.000 | 33,00% | 2,6% |
| ASELS.E | ASELSAN | 11.400.000.000.000 | 26,00% | 71,8% |
| FONET.E | FONET BILGI TEK. | 400.000.000.000 | 42,00% | 1,3% |
| INDES.E | INDEKS BILG. | 560.000.000.000 | 61,00% | 2,8% |
| KAREL.E | KAREL ELKTRNK | 583.200.000.000 | 29,00% | 2,3% |
| KFEIN.E | KAFEIN YAZILIM | 197.500.000.000 | 75,00% | 1,9% |
| KRONT.E | KRON TEL. | 142.685.130.000 | 56,00% | 1,3% |
| LOGO.E | LOGO YAZILIM | 250.000.000.000 | 65,00% | 10,0% |
| NETAS.E | NETAS TELEKOM. | 648.648.000.000 | 35,00% | 2,4% |
| SMART.E | SMARTIKS YAZ. | 318.625.000.000 | 49,00% | 1,3% |
| Relative Total weight to index | | | | 97,64% |

3.2.1 BIST 100 total

In the first part of thesis, we had created below regression formulation which are able to explain 33,40 percent of the variation at BIST 100 total index.

$$\text{BIST 100 total change (t)} = 0,021 + (0,16 * \text{industrial production index change (t-2)}) - (0,21 * \text{currency basket change (t)}) + (-0,6 * \text{M2 money supply change (t)}) + E$$

At this part we will try to enhance explanatory power with adding investor attention variable that has been created according to top ten stock of BIST 100 total investor attention measured by google SVI. Top ten stock of Bist 100 total index according to relative share and their investor attention measured by SVI has been given at below Table 3.16 as limited until the end of 2013.

According to regression results shown in the Table 3.15, Δ BIST 100 SVI is not a meaningful indicator for BIST 100 under 95 % significance level. But, it is important indicator when we decrease significance level to 90 %.

So, our final regression including examination of SVI does not change.

$$\underline{BIST\ 100\ total\ change\ (t)} = 0,021 + (0,16 * \text{industrial production index change (t-2)}) - (0,21 * \text{currency basket change (t)}) + (-0,6 * \text{M2 money supply change (t)}) + E$$

Table 3.15 : BIST 100 total – SVI regression result.

| Regression Statistics | |
|-----------------------|-------|
| Multiple R | 0,663 |
| R Square | 0,440 |
| Adjusted R Square | 0,387 |
| Standard Error | 0,032 |
| Observations | 59 |

| ANOVA | | | | | |
|------------|----|-------|-------|-------|----------------|
| | df | SS | MS | F | Significance F |
| Regression | 5 | 0,043 | 0,009 | 8,334 | 0,000 |
| Residual | 53 | 0,054 | 0,001 | | |
| Total | 58 | 0,097 | | | |

| | Coefficients | Standard Error | t Stat | P-value | Lower 95% | Upper 95% | Lower 95,0% | Upper 95,0% |
|---------------|--------------|----------------|--------|---------|-----------|-----------|-------------|-------------|
| Intercept | 0,019 | 0,005 | 3,462 | 0,001 | 0,008 | 0,029 | 0,008 | 0,029 |
| Δ IPI | 0,018 | 0,006 | 3,049 | 0,004 | 0,006 | 0,029 | 0,006 | 0,029 |
| Δ CBFR | 0,056 | 0,022 | 2,508 | 0,015 | 0,011 | 0,102 | 0,011 | 0,102 |
| Δ CB | -0,204 | 0,093 | -2,198 | 0,032 | -0,390 | -0,018 | -0,390 | -0,018 |
| Δ M2 | -0,739 | 0,250 | -2,954 | 0,005 | -1,241 | -0,237 | -1,241 | -0,237 |
| Δ SVI | 0,072 | 0,038 | 1,883 | 0,065 | -0,005 | 0,149 | -0,005 | 0,149 |

Table 3.16 : Δ BIST 100 total SVI independent variable.

| | SVI (Original Data) | | | | | | | | | | Total |
|-----------------------|---------------------|--------------|---------------|---------------|---------------|--------------|--------------|--------------|---------------|--------------|----------------|
| Partial Weight | 9,14% | 4,22% | 11,03% | 7,61% | 9,89% | 3,97% | 4,52% | 4,06% | 8,01% | 5,59% | 68,05% |
| Normd Weight | 13,43% | 6,20% | 16,20% | 11,19% | 14,54% | 5,84% | 6,64% | 5,96% | 11,78% | 8,22% | 100,00% |

| <i>MONTH&YEAR</i> | AKBNK.E | ASELS.E | BIMAS.E | EREGL.E | GARAN.E | ISCTR.E | KCHOL.E | SAHOLE | TCELLE | TUPRS.E | SVI BIST 100 | Δ SVI |
|------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------|---------------|----------------|---------------------|--------------------------------|
| 2012-07 | 48 | 4 | 47 | 16 | 77 | 51 | 0 | 35 | 53 | 6 | 39,1 | 0,24 |
| 2012-08 | 85 | 3 | 47 | 59 | 79 | 44 | 12 | 10 | 56 | 7 | 48,4 | -0,08 |
| 2012-09 | 57 | 5 | 56 | 36 | 78 | 36 | 24 | 41 | 50 | 3 | 44,7 | 0,09 |
| 2012-10 | 95 | 6 | 50 | 29 | 80 | 49 | 11 | 40 | 56 | 0 | 48,7 | -0,06 |
| 2012-11 | 66 | 5 | 62 | 11 | 77 | 58 | 11 | 47 | 59 | 3 | 45,8 | -0,03 |
| 2012-12 | 65 | 1 | 48 | 29 | 72 | 28 | 32 | 56 | 61 | 0 | 44,6 | 0,01 |
| 2013-01 | 64 | 4 | 42 | 13 | 91 | 39 | 20 | 37 | 74 | 3 | 45,1 | -0,04 |
| 2013-02 | 52 | 6 | 51 | 22 | 75 | 48 | 32 | 47 | 55 | 2 | 43,4 | 0,12 |
| 2013-03 | 62 | 4 | 66 | 23 | 78 | 41 | 34 | 39 | 68 | 3 | 48,4 | -0,03 |
| 2013-04 | 86 | 5 | 49 | 36 | 71 | 45 | 20 | 17 | 65 | 2 | 46,9 | -0,02 |
| 2013-05 | 34 | 2 | 69 | 38 | 69 | 51 | 14 | 38 | 81 | 2 | 46,0 | 0,00 |
| 2013-06 | 63 | 5 | 66 | 20 | 68 | 44 | 15 | 57 | 62 | 3 | 46,1 | -0,04 |
| 2013-07 | 39 | 6 | 58 | 29 | 76 | 53 | 34 | 22 | 64 | 8 | 44,2 | -0,11 |
| 2013-08 | 42 | 5 | 51 | 16 | 70 | 35 | 14 | 30 | 68 | 6 | 39,4 | 0,28 |
| 2013-09 | 72 | 3 | 71 | 32 | 78 | 35 | 19 | 35 | 69 | 7 | 50,4 | -0,09 |
| 2013-10 | 61 | 3 | 65 | 27 | 77 | 41 | 13 | 44 | 57 | 2 | 45,9 | -0,02 |
| 2013-11 | 44 | 4 | 64 | 21 | 77 | 36 | 9 | 58 | 67 | 8 | 44,8 | 0,03 |
| 2013-12 | 94 | 4 | 52 | 18 | 71 | 43 | 18 | 52 | 45 | 2 | 45,9 | 0,11 |

3.2.2 BIST 100 service

In the first part of thesis, we had created below regression formulation which are able to explain 23,60 percent of the variation at BIST 100 service index.

$$\underline{BIST\ 100\ Service\ change\ (t)} = 0,017 + (0,055 * \text{commercial bank funding rate change (t-1)}) + (-0,78 * \text{M2 money supply change (t)}) + E$$

At this part we will try to enhance explanatory power with adding investor attention variable that has been created according to top ten stock of BIST 100 service investor attention measured by google SVI. Top ten stock of Bist 100 service index according to relative share and their investor attention measured by SVI has been given at below Table 3.18 as limited until the end of 2013. Enerjisa, Mavi jeans and Sok marketer SVI data has been adjusted according to their IPO dates.

According to regression results shown in the Table 3.17, Δ BIST 100 Service SVI is not a meaningful indicator for BIST 100 under 95 % significance level.

So, our final regression including examination of SVI does not change.

$$\underline{BIST\ 100\ total\ change\ (t)} = 0,021 + (0,16 * \text{industrial production index change (t-2)}) - (0,21 * \text{currency basket change (t)}) + (-0,6 * \text{M2 money supply change (t)}) + E$$

Table 3.17 : BIST 100 service – SVI regression result.

| Regression Statistics | | | | | | | | |
|-----------------------|--------------|----------------|--------|---------|----------------|-----------|-------------|-------------|
| Multiple F | 0,487 | | | | | | | |
| R Square | 0,237 | | | | | | | |
| Adjusted R Square | 0,196 | | | | | | | |
| Standard Error | 0,047 | | | | | | | |
| Observations | 59 | | | | | | | |
| ANOVA | | | | | | | | |
| | df | SS | MS | F | Significance F | | | |
| Regression | 3 | 0,038 | 0,013 | 5,701 | 0,002 | | | |
| Residual | 55 | 0,123 | 0,002 | | | | | |
| Total | 58 | 0,161 | | | | | | |
| | Coefficients | Standard Error | t Stat | P-value | Lower 95% | Upper 95% | Lower 95,0% | Upper 95,0% |
| Intercept | 0,017 | 0,008 | 2,244 | 0,029 | 0,002 | 0,032 | 0,002 | 0,032 |
| Δ CBFR | 0,056 | 0,024 | 2,318 | 0,024 | 0,008 | 0,104 | 0,008 | 0,104 |
| Δ M2 | -0,786 | 0,233 | -3,371 | 0,001 | -1,254 | -0,319 | -1,254 | -0,319 |
| Δ SVI | -0,015 | 0,054 | -0,273 | 0,786 | -0,123 | 0,093 | -0,123 | 0,093 |

Table 3.18 : Δ BIST 100 service SVI independent variable.

| | SVI (Original Data) | | | | | | | | | | Total |
|-----------------------|---------------------|--------------|--------------|--------------|--------------|--------------|--------------|---------------|---------------|--------------|----------------|
| Partial Weight | 33,93% | 2,97% | 6,93% | 2,26% | 2,74% | 2,34% | 3,81% | 24,66% | 11,62% | 5,66% | 96,94% |
| Normd Weight | 35,00% | 3,07% | 7,15% | 2,33% | 2,83% | 2,41% | 3,93% | 25,44% | 11,99% | 5,84% | 100,00% |

| <i>MONTH&YEAR</i> | BIMAS.E | ENJSA.E | ENKALE | MAVLE | MGROS.E | PGSUS.E | SOKME | TCELLE | THYAO.E | TTKOM.E | SVI BIST 100 | Δ SVI |
|------------------------------|----------------|----------------|---------------|--------------|----------------|----------------|--------------|---------------|----------------|----------------|---------------------|--------------------------------|
| 2012-07 | 47 | 0 | 60 | 0 | 20 | 0 | 0 | 53 | 15 | 35 | 38,6 | -0,03 |
| 2012-08 | 47 | 0 | 47 | 0 | 35 | 4 | 0 | 56 | 11 | 16 | 37,4 | 0,08 |
| 2012-09 | 56 | 0 | 55 | 0 | 45 | 4 | 0 | 50 | 11 | 22 | 40,2 | -0,01 |
| 2012-10 | 50 | 0 | 58 | 0 | 32 | 0 | 0 | 56 | 12 | 24 | 39,6 | 0,11 |
| 2012-11 | 62 | 0 | 40 | 0 | 32 | 0 | 0 | 59 | 17 | 24 | 43,9 | -0,03 |
| 2012-12 | 48 | 0 | 49 | 0 | 73 | 4 | 0 | 61 | 23 | 35 | 42,8 | -0,01 |
| 2013-01 | 42 | 0 | 45 | 0 | 42 | 0 | 0 | 74 | 16 | 40 | 42,2 | -0,07 |
| 2013-02 | 51 | 0 | 45 | 0 | 23 | 0 | 0 | 55 | 14 | 31 | 39,2 | 0,21 |
| 2013-03 | 66 | 0 | 55 | 0 | 32 | 7 | 0 | 68 | 13 | 11 | 47,6 | -0,14 |
| 2013-04 | 49 | 0 | 47 | 0 | 29 | 11 | 0 | 65 | 14 | 16 | 40,7 | 0,35 |
| 2013-05 | 69 | 0 | 59 | 0 | 20 | 21 | 0 | 81 | 16 | 55 | 55,2 | -0,14 |
| 2013-06 | 66 | 0 | 42 | 0 | 49 | 13 | 0 | 62 | 20 | 23 | 47,3 | -0,05 |
| 2013-07 | 58 | 0 | 37 | 0 | 53 | 18 | 0 | 64 | 14 | 36 | 44,9 | -0,03 |
| 2013-08 | 51 | 0 | 50 | 0 | 28 | 28 | 0 | 68 | 10 | 34 | 43,4 | 0,19 |
| 2013-09 | 71 | 0 | 43 | 0 | 67 | 16 | 0 | 69 | 17 | 29 | 51,5 | -0,13 |
| 2013-10 | 65 | 0 | 45 | 0 | 34 | 13 | 0 | 57 | 10 | 33 | 44,9 | 0,05 |
| 2013-11 | 64 | 0 | 46 | 0 | 34 | 17 | 0 | 67 | 12 | 29 | 47,2 | -0,18 |
| 2013-12 | 52 | 0 | 58 | 0 | 30 | 45 | 0 | 45 | 15 | 23 | 38,9 | 0,32 |

3.2.3 BIST 100 financial

In the first part of thesis, we had created below regression formulation which are able to explain 30,40 percent of the variation at BIST 100 financial index.

$$\underline{BIST\ 100\ financial\ change\ (t)} = 0,016 + (0,017 * \text{industrial production index change (t-3)}) + (0,13 * \text{gold price (ons) (t)}) + (-1,00 * \text{M2 money supply change (t)}) + E$$

At this part we will try to enhance explanatory power with adding investor attention variable that has been created according to top ten stock of BIST 100 financial investor attention measured by google SVI. Top ten stock of Bist 100 financial index according to relative share and their investor attention measured by SVI has been given at below Table 3.20 as limited until the end of 2013.

According to regression results shown in the Table 3.19, Δ BIST 100 Financial SVI is not a meaningful indicator for BIST 100 under 95 % significance level.

So, our final regression including examination of SVI does not change.

$$\underline{BIST\ 100\ financial\ change\ (t)} = 0,016 + (0,017 * \text{industrial production index change (t-3)}) + (0,13 * \text{gold price (ons) (t)}) + (-1,00 * \text{M2 money supply change (t)}) + E$$

Table 3.19 : BIST 100 financial – SVI regression result.

| Regression Statistics | |
|-----------------------|-------|
| Multiple R | 0,556 |
| R Square | 0,309 |
| Adjusted R Square | 0,258 |
| Standard Error | 0,055 |
| Observations | 59 |

| ANOVA | | | | | |
|------------|----|-------|-------|-------|----------------|
| | df | SS | MS | F | Significance F |
| Regression | 4 | 0,072 | 0,018 | 6,048 | 0,000 |
| Residual | 54 | 0,162 | 0,003 | | |
| Total | 58 | 0,234 | | | |

| | Coefficients | Standard Error | t Stat | P-value | Lower 95% | Upper 95% | Lower 95,0% | Upper 95,0% |
|--------------|--------------|----------------|--------|---------|-----------|-----------|-------------|-------------|
| Intercept | 0,017 | 0,009 | 1,892 | 0,064 | -0,001 | 0,035 | -0,001 | 0,035 |
| Δ IPI | 0,017 | 0,010 | 1,768 | 0,083 | -0,002 | 0,037 | -0,002 | 0,037 |
| Δ G | 0,126 | 0,059 | 2,139 | 0,037 | 0,008 | 0,245 | 0,008 | 0,245 |
| Δ M2 | -1,016 | 0,272 | -3,736 | 0,000 | -1,562 | -0,471 | -1,562 | -0,471 |
| Δ SVI | -0,038 | 0,059 | -0,646 | 0,521 | -0,155 | 0,080 | -0,155 | 0,080 |

Table 3.20 : Δ BIST 100 financial SVI independent variable.

| | SVI (Original Data) | | | | | | | | | | Total |
|-----------------------|---------------------|---------------|--------------|--------------|---------------|--------------|--------------|--------------|--------------|--------------|----------------|
| Partial Weight | 19,33% | 20,92% | 3,92% | 8,40% | 9,56% | 8,58% | 4,04% | 3,07% | 3,70% | 6,11% | 87,65% |
| Normd Weight | 22,05% | 23,87% | 4,48% | 9,59% | 10,91% | 9,79% | 4,61% | 3,50% | 4,22% | 6,97% | 100,00% |

| MONTH&YEAR | AKBNK.E | GARAN.E | HALKB.E | ISCTR.E | KCHOL.E | SAHOL.E | SISE.E | TAVHL.E | VAKBN.E | YKBNK.E | SVI BIST 100 | Δ SVI |
|-----------------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------|----------------|----------------|----------------|---------------------|--------------------------------|
| 2012-07 | 48 | 77 | 30 | 51 | 0 | 35 | 60 | 6 | 0 | 22 | 43,1 | 0,16 |
| 2012-08 | 85 | 79 | 25 | 44 | 12 | 10 | 56 | 17 | 24 | 11 | 50,2 | -0,05 |
| 2012-09 | 57 | 78 | 40 | 36 | 24 | 41 | 56 | 12 | 24 | 11 | 47,8 | 0,15 |
| 2012-10 | 95 | 80 | 24 | 49 | 11 | 40 | 63 | 10 | 11 | 5 | 55,0 | -0,08 |
| 2012-11 | 66 | 77 | 49 | 58 | 11 | 47 | 64 | 0 | 0 | 20 | 50,8 | -0,05 |
| 2012-12 | 65 | 72 | 41 | 28 | 32 | 56 | 60 | 11 | 0 | 0 | 48,2 | 0,09 |
| 2013-01 | 64 | 91 | 41 | 39 | 20 | 37 | 70 | 7 | 20 | 14 | 52,5 | -0,08 |
| 2013-02 | 52 | 75 | 41 | 48 | 32 | 47 | 63 | 13 | 0 | 15 | 48,3 | 0,06 |
| 2013-03 | 62 | 78 | 42 | 41 | 34 | 39 | 66 | 16 | 19 | 14 | 51,0 | 0,00 |
| 2013-04 | 86 | 71 | 37 | 45 | 20 | 17 | 77 | 10 | 10 | 14 | 51,0 | -0,20 |
| 2013-05 | 34 | 69 | 32 | 51 | 14 | 38 | 72 | 39 | 10 | 0 | 40,6 | 0,18 |
| 2013-06 | 63 | 68 | 26 | 44 | 15 | 57 | 73 | 19 | 20 | 5 | 47,9 | -0,04 |
| 2013-07 | 39 | 76 | 48 | 53 | 34 | 22 | 75 | 14 | 19 | 18 | 45,8 | -0,12 |
| 2013-08 | 42 | 70 | 31 | 35 | 14 | 30 | 73 | 7 | 0 | 22 | 40,3 | 0,23 |
| 2013-09 | 72 | 78 | 27 | 35 | 19 | 35 | 66 | 9 | 9 | 18 | 49,6 | -0,03 |
| 2013-10 | 61 | 77 | 33 | 41 | 13 | 44 | 76 | 4 | 9 | 12 | 47,8 | -0,06 |
| 2013-11 | 44 | 77 | 28 | 36 | 9 | 58 | 69 | 4 | 27 | 13 | 44,8 | 0,26 |
| 2013-12 | 94 | 71 | 56 | 43 | 18 | 52 | 73 | 7 | 18 | 13 | 56,6 | -0,01 |

3.2.4 BIST 100 industrial

In the first part of thesis, we had created below regression formulation which are able to explain 12,20 percent of the variation at BIST 100 industrial index.

$$\text{BIST 100 industrial change (t)} = 0,012 + (0,017 * \text{industrial production index change (t-3)}) + (0,09 * \text{gold price (ons) (t)}) + E$$

At this part we will try to enhance explanatory power with adding investor attention variable that has been created according to top ten stock of BIST 100 industrial investor attention measured by google SVI. Top ten stock of Bist 100 industrial index according to relative share and their investor attention measured by SVI has been given at below Table 3.22 as limited until the end of 2013.

According to regression results shown in the Table 3.21, Δ BIST 100 industrial SVI is not a meaningful indicator for BIST 100 under 95 % significance level.

So, our final regression including examination of SVI does not change.

$$\text{BIST 100 industrial change (t)} = 0,012 + (0,017 * \text{industrial production index change (t-3)}) + (0,09 * \text{gold price (ons) (t)}) + E$$

Table 3.21 : BIST 100 industrial – SVI regression result.

| Regression Statistics | |
|-----------------------|-------|
| Multiple R | 0,349 |
| R Square | 0,122 |
| Adjusted R Square | 0,074 |
| Standard Error | 0,046 |
| Observations | 59 |

| ANOVA | | | | | |
|------------|----|-------|-------|-------|----------------|
| | df | SS | MS | F | Significance F |
| Regression | 3 | 0,016 | 0,005 | 2,550 | 0,065 |
| Residual | 55 | 0,118 | 0,002 | | |
| Total | 58 | 0,134 | | | |

| | Coefficients | Standard Error | t Stat | P-value | Lower 95% | Upper 95% | Lower 95,0% | Upper 95,0% |
|--------------|--------------|----------------|--------|---------|-----------|-----------|-------------|-------------|
| Intercept | 0,012 | 0,006 | 1,853 | 0,069 | -0,001 | 0,025 | -0,001 | 0,025 |
| Δ IPI | 0,017 | 0,008 | 2,025 | 0,048 | 0,000 | 0,033 | 0,000 | 0,033 |
| Δ G | 0,092 | 0,049 | 1,880 | 0,065 | -0,006 | 0,190 | -0,006 | 0,190 |
| Δ SVI | 0,003 | 0,035 | 0,086 | 0,932 | -0,066 | 0,072 | -0,066 | 0,072 |

Table 3.22 : Δ BIST 100 industrial SVI independent variable.

| | SVI (Original Data) | | | | | | | | | | Total |
|-----------------------|---------------------|---------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|----------------|
| Partial Weight | 22,74% | 16,70% | 5,88% | 5,61% | 5,08% | 4,89% | 4,72% | 4,12% | 4,01% | 3,59% | 77,35% |
| Normd Weight | 29,40% | 21,59% | 7,61% | 7,25% | 6,56% | 6,32% | 6,11% | 5,33% | 5,19% | 4,64% | 100,00% |

| <i>MONTH&YEAR</i> | <i>EREGLE</i> | <i>TUPRS</i> | <i>AEFES</i> | <i>FROTO</i> | <i>PETKM</i> | <i>KOZAL</i> | <i>ULKER</i> | <i>ARCLK</i> | <i>CCOLA</i> | <i>SODA</i> | SVI BIST 100 | Δ SVI |
|------------------------------|----------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|--------------------|---------------------|--------------------------------|
| 2012-07 | 16 | 6 | 24 | 99 | 6 | 7 | 15 | 0 | 19 | 58 | 20,4 | 0,58 |
| 2012-08 | 59 | 7 | 16 | 87 | 6 | 9 | 17 | 10 | 15 | 57 | 32,3 | -0,09 |
| 2012-09 | 36 | 3 | 56 | 99 | 5 | 12 | 20 | 10 | 27 | 57 | 29,6 | -0,24 |
| 2012-10 | 29 | 0 | 15 | 83 | 6 | 8 | 27 | 0 | 31 | 54 | 22,3 | -0,12 |
| 2012-11 | 11 | 3 | 44 | 68 | 7 | 11 | 20 | 9 | 39 | 56 | 19,6 | 0,15 |
| 2012-12 | 29 | 0 | 29 | 75 | 13 | 14 | 18 | 9 | 7 | 60 | 22,6 | 0,02 |
| 2013-01 | 13 | 3 | 67 | 85 | 4 | 15 | 18 | 24 | 22 | 59 | 23,2 | 0,01 |
| 2013-02 | 22 | 2 | 36 | 87 | 9 | 20 | 17 | 17 | 21 | 58 | 23,5 | -0,02 |
| 2013-03 | 23 | 3 | 32 | 71 | 4 | 24 | 17 | 8 | 38 | 63 | 23,1 | 0,19 |
| 2013-04 | 36 | 2 | 66 | 59 | 3 | 19 | 17 | 0 | 38 | 58 | 27,4 | 0,07 |
| 2013-05 | 38 | 2 | 51 | 86 | 8 | 31 | 15 | 8 | 22 | 59 | 29,4 | -0,19 |
| 2013-06 | 20 | 3 | 60 | 81 | 5 | 20 | 20 | 8 | 19 | 60 | 24,0 | 0,13 |
| 2013-07 | 29 | 8 | 65 | 68 | 3 | 16 | 19 | 8 | 28 | 61 | 27,2 | -0,31 |
| 2013-08 | 16 | 6 | 19 | 69 | 0 | 18 | 13 | 8 | 22 | 60 | 18,7 | 0,43 |
| 2013-09 | 32 | 7 | 45 | 70 | 3 | 19 | 18 | 8 | 34 | 59 | 26,8 | -0,15 |
| 2013-10 | 27 | 2 | 30 | 76 | 2 | 10 | 33 | 7 | 20 | 55 | 22,9 | 0,12 |
| 2013-11 | 21 | 8 | 37 | 99 | 6 | 15 | 28 | 0 | 38 | 57 | 25,6 | -0,25 |
| 2013-12 | 18 | 2 | 12 | 81 | 2 | 23 | 20 | 7 | 15 | 58 | 19,2 | 0,27 |

3.2.5 BIST 100 technology

In the first part of thesis, we had created below regression formulation which are able to explain 23,90 percent of the variation at BIST 100 technology index.

$$\text{BIST 100 technology change (t)} = 0,031 + (0,07 * \text{commercial bank funding rate change (t-1)}) + (-0,495 * \text{currency basket change (t)}) + E$$

At this part we will try to enhance explanatory power with adding investor attention variable that has been created according to top ten stock of BIST 100 technology investor attention measured by google SVI. Top ten stock of Bist 100 technology index according to relative share and their investor attention measured by SVI has been given at below Table 3.24 as limited until the end of 2013.

According to regression results shown in the Table 3.23, Δ BIST 100 industrial SVI is not a meaningful indicator for BIST 100 under 95 % significance level.

So, our final regression including examination of SVI does not change.

$$\text{BIST 100 technology change (t)} = 0,031 + (0,07 * \text{commercial bank funding rate change (t-1)}) + (-0,495 * \text{currency basket change (t)}) + E$$

Table 3.23 : BIST 100 technology – SVI regression result.

| Regression Statistics | |
|-----------------------|-------|
| Multiple R | 0,496 |
| R Square | 0,246 |
| Adjusted R Square | 0,206 |
| Standard Error | 0,067 |
| Observations | 61 |

| ANOVA | | | | | |
|------------|----|-------|-------|-------|----------------|
| | df | SS | MS | F | Significance F |
| Regression | 3 | 0,084 | 0,028 | 6,195 | 0,001 |
| Residual | 57 | 0,257 | 0,005 | | |
| Total | 60 | 0,341 | | | |

| | Coefficients | Standard Error | t Stat | P-value | Lower 95% | Upper 95% | Lower 95,0% | Upper 95,0% |
|--------------|--------------|----------------|--------|---------|-----------|-----------|-------------|-------------|
| Intercept | 0,029 | 0,010 | 3,090 | 0,003 | 0,010 | 0,049 | 0,010 | 0,049 |
| Δ CBF | 0,073 | 0,034 | 2,147 | 0,036 | 0,005 | 0,141 | 0,005 | 0,141 |
| Δ CB | -0,490 | 0,139 | -3,517 | 0,001 | -0,769 | -0,211 | -0,769 | -0,211 |
| Δ SVI | 0,019 | 0,025 | 0,734 | 0,466 | -0,032 | 0,070 | -0,032 | 0,070 |

Table 3.24 : Δ BIST 100 technology SVI independent variable.

| | SVI (Original Data) | | | | | | | | | | Total |
|-----------------------|---------------------|---------------|--------------|--------------|--------------|--------------|--------------|---------------|--------------|--------------|----------------|
| Partial Weight | 2,61% | 71,81% | 1,27% | 2,75% | 2,31% | 1,89% | 1,30% | 9,96% | 2,40% | 1,33% | 97,64% |
| Normd Weight | 2,68% | 73,54% | 1,31% | 2,82% | 2,36% | 1,94% | 1,33% | 10,20% | 2,46% | 1,36% | 100,00% |

| <u>MONTH&YEAR</u> | <u>ALCTL.E</u> | <u>ASEL.E</u> | <u>FONET.E</u> | <u>INDES.E</u> | <u>KAREL.E</u> | <u>KFEIN.E</u> | <u>KRONT.E</u> | <u>LOGO.E</u> | <u>NETAS.E</u> | <u>SMART.E</u> | <u>SVI BIST 100</u> | Δ SVI |
|-----------------------|----------------|---------------|----------------|----------------|----------------|----------------|----------------|---------------|----------------|----------------|---------------------|--------------|
| 2012-07 | 22 | 4 | 7 | 58 | 51 | 27 | 27 | 0 | 98 | 60 | 10,6 | 0,47 |
| 2012-08 | 19 | 3 | 8 | 63 | 54 | 27 | 30 | 55 | 94 | 62 | 15,6 | -0,26 |
| 2012-09 | 16 | 5 | 12 | 71 | 64 | 27 | 14 | 0 | 89 | 66 | 11,6 | 0,93 |
| 2012-10 | 20 | 6 | 9 | 75 | 68 | 0 | 16 | 100 | 89 | 66 | 22,3 | -0,48 |
| 2012-11 | 20 | 5 | 8 | 69 | 70 | 0 | 16 | 0 | 97 | 71 | 11,5 | 0,13 |
| 2012-12 | 6 | 1 | 11 | 62 | 64 | 0 | 37 | 51 | 84 | 70 | 13,0 | -0,17 |
| 2013-01 | 18 | 4 | 6 | 58 | 100 | 0 | 30 | 0 | 78 | 69 | 10,8 | 0,59 |
| 2013-02 | 34 | 6 | 9 | 63 | 66 | 0 | 18 | 50 | 86 | 66 | 17,1 | -0,10 |
| 2013-03 | 31 | 4 | 7 | 68 | 67 | 22 | 10 | 45 | 80 | 65 | 15,4 | -0,26 |
| 2013-04 | 23 | 5 | 9 | 70 | 61 | 22 | 9 | 0 | 88 | 65 | 11,4 | -0,25 |
| 2013-05 | 25 | 2 | 6 | 61 | 64 | 0 | 11 | 0 | 82 | 66 | 8,5 | 0,26 |
| 2013-06 | 8 | 5 | 4 | 66 | 55 | 22 | 6 | 0 | 89 | 65 | 10,7 | 0,03 |
| 2013-07 | 5 | 6 | 7 | 71 | 48 | 22 | 9 | 0 | 73 | 66 | 11,0 | -0,09 |
| 2013-08 | 18 | 5 | 5 | 61 | 49 | 0 | 7 | 0 | 76 | 68 | 10,0 | 0,37 |
| 2013-09 | 7 | 3 | 9 | 71 | 57 | 21 | 6 | 44 | 78 | 69 | 13,7 | -0,36 |
| 2013-10 | 5 | 3 | 6 | 70 | 59 | 0 | 4 | 0 | 78 | 72 | 8,7 | 0,72 |
| 2013-11 | 14 | 4 | 7 | 86 | 63 | 0 | 30 | 43 | 78 | 74 | 15,0 | -0,40 |
| 2013-12 | 5 | 4 | 9 | 59 | 58 | 0 | 8 | 0 | 65 | 76 | 9,0 | 0,01 |

3.3 Predicting Stock Returns on Borsa Istanbul Index with Macroeconomic Indicators & Google SVI & News Sentiment

In the first part of thesis producer price index, industrial production index, commercial banking funding rate, currency basket, gold price (ons), M2 money supply of TCB, Brent oil (USD), Copper (USD) has been taken into consideration as possible macroeconomic variables effects stock return at BIST 100 total, BIST 100 service, BIST 100 financial, BIST 100 industrial, BIST 100 technology index. Upon detail statistical analysis, we created regression formulas for each index, explains 12,20 % to 33,40 % variations on index returns. At the second phase, we use the google search volume index to measure investor attention within same period between July 2012 and August 2018 at monthly basis and try to implement available regression formulas as increasing explanatory power. Investor attention has been extracted by using top 10 stock ticker in that BIST index and created one single investor attention independent variable using relative weight on the index (Url-7). Change to previous month of investor attention variable has been taken into consideration as independent variable and included into regressions. At the last part of thesis, we employ bloomberg news sentiment data, within the same date interval and create one unique investor sentiment variable using partial index weight of top 10 stocks for each index. Bloomberg news sentiment has been working on the basis of machine learning algorithm applied to thousands of news source and classified them into positive, negative and neutral and gives the overall sentiment of news in a certain period of time (Url-4). Even if its time horizon is most likely to be short term scope like daily, in our analysis we used monthly basis news sentiment considering daily effect will be realized in monthly basis too without fully realization reverse.

3.3.1 BIST 100 total

In the second part of thesis, we tested investor sentiment to available regression to include a meaningful indicator.

$$\underline{BIST\ 100\ total\ change\ (t)} = 0,021 + (0,16 * \text{industrial production index change (t-2)}) - (0,21 * \text{currency basket change (t)}) + (-0,6 * \text{M2 money supply change (t)}) + E$$

We try to enhance explanatory power with adding investor sentiment variable that has been created according to top ten stock of BIST 100 total investor sentiment measured by bloomberg news sentiment. Top ten stock of Bist 100 total index according to relative share and their investor sentiment measured by bloomberg news sentiment has been given at below Table 3.26 as limited until the end of 2013. According to regression results shown at the Table 3.25, Δ BIST 100 news sentiment is a meaningful indicator for BIST 100 under 95 % significance level and increase the explanatory power from 33,40 % to 44,50 % on BIST 100 total index returns and make the commercial banking funding rate meanful indicator and includes the regression formula. So, our final regression including examination of news sentiment

$$\underline{BIST\ 100\ total\ change\ (t)} = 0,018 + (0,018 * \text{industrial production index change (t-2)}) + (0,057 * \text{commercial banks funding rate (t-2)}) - (0,267 * \text{currency basket change (t)}) + (-0,654 * \text{M2 money supply change (t)}) + (0,001 * \text{News sentiment (t)}) + E$$

Table 3.25 : BIST 100 total – News Sentiment regression result.

| <i>Regression Statistics</i> | |
|------------------------------|-------|
| Multiple R | 0,667 |
| R Square | 0,445 |
| Adjusted R Square | 0,392 |
| Standard Error | 0,032 |
| Observations | 59 |

| <i>ANOVA</i> | | | | | |
|--------------|-----------|-----------|-----------|----------|-----------------------|
| | <i>df</i> | <i>SS</i> | <i>MS</i> | <i>F</i> | <i>Significance F</i> |
| Regression | 5 | 0,043 | 0,009 | 8,484 | 0,000 |
| Residual | 53 | 0,054 | 0,001 | | |
| Total | 58 | 0,097 | | | |

| | <i>Coefficients</i> | <i>Standard Error</i> | <i>t Stat</i> | <i>P-value</i> | <i>Lower 95%</i> | <i>Upper 95%</i> | <i>Lower 95,0%</i> | <i>Upper 95,0%</i> |
|---------------|---------------------|-----------------------|---------------|----------------|------------------|------------------|--------------------|--------------------|
| Intercept | 0,018 | 0,005 | 3,397 | 0,001 | 0,008 | 0,029 | 0,008 | 0,029 |
| Δ IPI | 0,018 | 0,006 | 3,165 | 0,003 | 0,007 | 0,030 | 0,007 | 0,030 |
| Δ CBFR | 0,057 | 0,022 | 2,551 | 0,014 | 0,012 | 0,102 | 0,012 | 0,102 |
| Δ CB | -0,267 | 0,096 | -2,773 | 0,008 | -0,460 | -0,074 | -0,460 | -0,074 |
| Δ M2 | -0,654 | 0,252 | -2,596 | 0,012 | -1,160 | -0,149 | -1,160 | -0,149 |
| Δ NS | 0,000 | 0,000 | 1,999 | 0,051 | 0,000 | 0,001 | 0,000 | 0,001 |

Table 3.26 : Δ BIST 100 total NS independent variable.

| | News Sentiment (Original Data) | | | | | | | | | | Total | |
|-----------------------|--------------------------------|--------------|---------------|---------------|---------------|--------------|--------------|--------------|---------------|--------------|----------------|--|
| Partial Weight | 9,14% | 4,22% | 11,03% | 7,61% | 9,89% | 3,97% | 4,52% | 4,06% | 8,01% | 5,59% | 68,05% | |
| Normd Weight | 13,43% | 6,20% | 16,20% | 11,19% | 14,54% | 5,84% | 6,64% | 5,96% | 11,78% | 8,22% | 100,00% | |

| <i>MONTH&YEAR</i> | AKBNK.E | ASELS.E | BIMAS.E | EREGL.E | GARAN.E | ISCTR.E | KCHOL.E | SAHOLE | TCELL.E | TUPRS.E | NS BIST 100 | Δ NS |
|------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------|----------------|----------------|--------------------|-------------------------------|
| 2012-07 | 0,13 | -0,57 | 0,16 | 0,43 | 0,35 | 0,42 | 0,01 | 0,29 | 0,44 | -0,43 | 0,2 | -0,09 |
| 2012-08 | 0,02 | -0,57 | 0,63 | 0,43 | 0,00 | 0,01 | 0,12 | 0,36 | -0,24 | 0,42 | 0,2 | 0,56 |
| 2012-09 | 0,00 | -0,57 | 0,63 | 0,43 | 0,00 | -0,02 | 0,12 | 0,36 | 0,51 | 0,42 | 0,2 | -0,32 |
| 2012-10 | -0,16 | -0,57 | 0,63 | 0,55 | 0,03 | 0,00 | -0,02 | 0,36 | 0,12 | 0,19 | 0,2 | 0,49 |
| 2012-11 | 0,20 | -0,57 | 0,51 | 0,55 | 0,12 | 0,08 | 0,23 | 0,53 | 0,08 | 0,32 | 0,2 | 0,34 |
| 2012-12 | 0,19 | 0,45 | 0,51 | 0,55 | 0,13 | -0,09 | 0,19 | 0,23 | 0,51 | 0,32 | 0,3 | -0,60 |
| 2013-01 | 0,14 | 0,45 | 0,51 | 0,55 | -0,09 | 0,02 | 0,14 | 0,00 | -0,19 | -0,41 | 0,1 | 0,97 |
| 2013-02 | 0,49 | 0,04 | 0,51 | 0,67 | 0,04 | -0,32 | -0,38 | 0,00 | 0,27 | 0,45 | 0,3 | -0,69 |
| 2013-03 | 0,00 | -0,79 | 0,12 | 0,42 | 0,00 | 0,03 | 0,13 | 0,00 | 0,23 | 0,31 | 0,1 | 0,58 |
| 2013-04 | 0,65 | 0,21 | -0,13 | 0,11 | 0,03 | 0,08 | 0,01 | 0,00 | 0,36 | -0,20 | 0,1 | 0,00 |
| 2013-05 | 0,19 | 0,21 | 0,56 | 0,26 | 0,05 | 0,00 | 0,00 | -0,11 | 0,00 | -0,39 | 0,1 | 0,49 |
| 2013-06 | 0,29 | 0,21 | 0,32 | 0,34 | 0,00 | -0,20 | 0,20 | 0,20 | 0,04 | 0,37 | 0,2 | -0,36 |
| 2013-07 | -0,26 | 0,21 | 0,32 | 0,34 | 0,59 | 0,00 | -0,14 | 0,01 | 0,03 | -0,31 | 0,1 | 0,52 |
| 2013-08 | -0,26 | 0,00 | 0,73 | 0,00 | 0,47 | -0,03 | 0,50 | -0,34 | 0,24 | -0,07 | 0,2 | -0,43 |
| 2013-09 | -0,29 | 0,00 | 0,73 | 0,51 | -0,29 | -0,03 | -0,08 | 0,18 | 0,11 | -0,07 | 0,1 | 0,18 |
| 2013-10 | -0,57 | 0,00 | 0,73 | 0,51 | 0,22 | -0,56 | 0,00 | 0,18 | 0,16 | -0,07 | 0,1 | 0,93 |
| 2013-11 | 0,39 | 0,26 | 0,32 | 0,55 | 0,27 | 0,09 | -0,49 | 0,43 | 0,09 | 0,08 | 0,2 | -0,44 |
| 2013-12 | 0,00 | 0,15 | 0,32 | 0,55 | -0,14 | 0,03 | 0,15 | 0,00 | 0,09 | 0,08 | 0,1 | 0,09 |

3.3.2 BIST 100 service

In the second part of thesis, we tested investor sentiment to available regression to include a meaningful indicator.

$$\text{BIST 100 Service change (t)} = 0,017 + (0,055 * \text{commercial bank funding rate change (t-1)}) + (-0,78 * \text{M2 money supply change (t)}) + E$$

We try to enhance explanatory power with adding investor sentiment variable that has been created according to top ten stock of BIST 100 service investor sentiment measured by bloomberg news sentiment. Top ten stock of BIST 100 service index according to relative share and their investor sentiment measured by bloomberg news sentiment has been given at below Table 3.28 as limited until the end of 2013. According to regression results shown at the Table 3.27, Δ BIST 100 service news sentiment is not a meaningful indicator for BIST 100 service index under 95 % significance level.

So, our final regression including examination of news sentiment

$$\text{BIST 100 Service change (t)} = 0,017 + (0,055 * \text{commercial bank funding rate change (t-1)}) + (-0,78 * \text{M2 money supply change (t)}) + E$$

Table 3.27 : BIST 100 service – News Sentiment regression result.

| Regression Statistics | |
|-----------------------|-------|
| Multiple R | 0,492 |
| R Square | 0,242 |
| Adjusted R Square | 0,201 |
| Standard Error | 0,047 |
| Observations | 59 |

| ANOVA | | | | | |
|------------|----|-------|-------|-------|----------------|
| | df | SS | MS | F | Significance F |
| Regression | 3 | 0,039 | 0,013 | 5,853 | 0,002 |
| Residual | 55 | 0,122 | 0,002 | | |
| Total | 58 | 0,161 | | | |

| | Coefficients | Standard Error | t Stat | P-value | Lower 95% | Upper 95% | Lower 95,0% | Upper 95,0% |
|---------------|--------------|----------------|--------|---------|-----------|-----------|-------------|-------------|
| Intercept | 0,017 | 0,008 | 2,295 | 0,026 | 0,002 | 0,032 | 0,002 | 0,032 |
| Δ CBFR | 0,055 | 0,024 | 2,292 | 0,026 | 0,007 | 0,103 | 0,007 | 0,103 |
| Δ M2 | -0,785 | 0,232 | -3,383 | 0,001 | -1,251 | -0,320 | -1,251 | -0,320 |
| Δ NS | 0,000 | 0,001 | 0,651 | 0,518 | -0,001 | 0,002 | -0,001 | 0,002 |

Table 3.28 : Δ BIST 100 service NS independent variable.

| | News Sentiment (Original Data) | | | | | | | | | | Total |
|-----------------------|--------------------------------|--------------|--------------|--------------|--------------|--------------|--------------|---------------|---------------|--------------|----------------|
| Partial Weight | 33,93% | 2,97% | 6,93% | 2,26% | 2,74% | 2,34% | 3,81% | 24,66% | 11,62% | 5,66% | 96,94% |
| Normd Weight | 35,00% | 3,07% | 7,15% | 2,33% | 2,83% | 2,41% | 3,93% | 25,44% | 11,99% | 5,84% | 100,00% |

| MONTH&YEAR | BIMAS.E | ENJSA.E | ENKALE | MAVLE | MGROS.E | PGSUS.E | SOKME | TCELLE | THYAO.E | TTKOM.ENS | BIST 100 | Δ NS |
|-----------------------|----------------|----------------|---------------|--------------|----------------|----------------|--------------|---------------|----------------|------------------|-----------------|-------------------------------|
| 2012-07 | 0,160 | 0,000 | 0,087 | 0,000 | 0,618 | 0,107 | 0,000 | 0,444 | -0,074 | 0,333 | 0,2 | -0,03 |
| 2012-08 | 0,631 | 0,000 | 0,087 | 0,000 | 0,618 | 0,107 | 0,000 | -0,242 | 0,294 | -0,348 | 0,2 | 0,92 |
| 2012-09 | 0,631 | 0,000 | 0,087 | 0,000 | 0,618 | 0,107 | 0,000 | 0,507 | -0,091 | 0,332 | 0,4 | -0,02 |
| 2012-10 | 0,631 | 0,000 | 0,087 | 0,000 | 0,618 | 0,107 | 0,000 | 0,115 | 0,536 | 0,622 | 0,4 | -0,33 |
| 2012-11 | 0,506 | 0,000 | 0,445 | 0,000 | 0,007 | -0,126 | 0,000 | 0,079 | 0,292 | -0,179 | 0,3 | 0,27 |
| 2012-12 | 0,506 | 0,000 | 0,445 | 0,000 | 0,106 | -0,123 | 0,000 | 0,512 | -0,168 | 0,000 | 0,3 | -0,70 |
| 2013-01 | 0,506 | 0,000 | -0,666 | 0,000 | 0,106 | 0,418 | 0,000 | -0,189 | 0,012 | 0,000 | 0,1 | 1,13 |
| 2013-02 | 0,506 | 0,000 | -0,666 | 0,000 | 0,182 | 0,000 | 0,000 | 0,270 | 0,000 | 0,021 | 0,2 | -0,34 |
| 2013-03 | 0,120 | 0,000 | 0,466 | 0,000 | 0,182 | 0,000 | 0,000 | 0,235 | -0,046 | 0,021 | 0,1 | -0,25 |
| 2013-04 | -0,130 | 0,000 | -0,110 | 0,000 | 0,015 | 0,000 | 0,000 | 0,365 | 0,378 | 0,291 | 0,1 | 1,31 |
| 2013-05 | 0,564 | 0,000 | 0,482 | 0,000 | 0,512 | -0,391 | 0,000 | 0,000 | 0,071 | -0,163 | 0,2 | 0,09 |
| 2013-06 | 0,320 | 0,000 | 0,482 | 0,000 | 0,512 | -0,433 | 0,000 | 0,035 | 0,656 | 0,320 | 0,3 | -0,39 |
| 2013-07 | 0,320 | 0,000 | 0,482 | 0,000 | 0,177 | -0,433 | 0,000 | 0,028 | 0,088 | -0,048 | 0,2 | 1,22 |
| 2013-08 | 0,734 | 0,000 | 0,759 | 0,000 | -0,410 | -0,722 | 0,000 | 0,240 | 0,046 | -0,048 | 0,3 | -0,18 |
| 2013-09 | 0,734 | 0,000 | 0,759 | 0,000 | -0,410 | -0,722 | 0,000 | 0,107 | -0,215 | 0,000 | 0,3 | 0,21 |
| 2013-10 | 0,734 | 0,000 | 0,759 | 0,000 | -0,410 | 0,000 | 0,000 | 0,162 | 0,000 | 0,024 | 0,3 | -0,49 |
| 2013-11 | 0,324 | 0,000 | 0,759 | 0,000 | 0,627 | 0,335 | 0,000 | 0,092 | -0,347 | 0,011 | 0,2 | 0,60 |
| 2013-12 | 0,324 | 0,000 | 0,759 | 0,000 | 0,627 | 0,335 | 0,000 | 0,092 | 0,398 | 0,302 | 0,3 | -0,12 |

3.3.3 BIST 100 financial

In the second part of thesis, we tested investor sentiment to available regression to include a meaningful indicator.

$$\text{BIST 100 financial change } (t) = 0,016 + (0,017 * \text{industrial production index change } (t-3)) + (0,13 * \text{gold price (ons) } (t)) + (-1,00 * \text{M2 money supply change } (t)) + E$$

We try to enhance explanatory power with adding investor sentiment variable that has been created according to top ten stock of BIST 100 financial investor sentiment measured by bloomberg news sentiment. top ten stock of BIST 100 financial index according to relative share and their investor sentiment measured by bloomberg news sentiment has been given at below Table 3.30 as limited until the end of 2013.

According to regression results shown at the Table 3.29, Δ BIST 100 financial news sentiment is not a meaningful indicator for BIST 100 financial index under 95 % significance level. So, our final regression including examination of news sentiment

$$\text{BIST 100 financial change } (t) = 0,016 + (0,017 * \text{industrial production index change } (t-3)) + (0,13 * \text{gold price (ons) } (t)) + (-1,00 * \text{M2 money supply change } (t)) + E$$

Table 3.29 : BIST 100 financial – News Sentiment regression result.

| Regression Statistics | |
|-----------------------|-------|
| Multiple R | 0,575 |
| R Square | 0,330 |
| Adjusted R Square | 0,281 |
| Standard Error | 0,054 |
| Observations | 59 |

| ANOVA | | | | | |
|------------|----|-------|-------|-------|----------------|
| | df | SS | MS | F | Significance F |
| Regression | 4 | 0,077 | 0,019 | 6,664 | 0,000 |
| Residual | 54 | 0,157 | 0,003 | | |
| Total | 58 | 0,234 | | | |

| | Coefficients | Standard Error | t Stat | P-value | Lower 95% | Upper 95% | Lower 95,0% | Upper 95,0% |
|--------------|--------------|----------------|--------|---------|-----------|-----------|-------------|-------------|
| Intercept | 0,016 | 0,009 | 1,797 | 0,078 | -0,002 | 0,033 | -0,002 | 0,033 |
| Δ IPI | 0,019 | 0,010 | 1,924 | 0,060 | -0,001 | 0,038 | -0,001 | 0,038 |
| Δ G | 0,145 | 0,057 | 2,533 | 0,014 | 0,030 | 0,260 | 0,030 | 0,260 |
| Δ M2 | -0,994 | 0,267 | -3,722 | 0,000 | -1,529 | -0,458 | -1,529 | -0,458 |
| Δ NS | -0,002 | 0,001 | -1,460 | 0,150 | -0,004 | 0,001 | -0,004 | 0,001 |

Table 3.30 : Δ BIST 100 financial NS independent variable.

| | News Sentiment (Original Data) | | | | | | | | | | Total |
|-----------------------|--------------------------------|---------------|--------------|--------------|---------------|--------------|--------------|--------------|--------------|--------------|----------------|
| Partial Weight | 19,33% | 20,92% | 3,92% | 8,40% | 9,56% | 8,58% | 4,04% | 3,07% | 3,70% | 6,11% | 87,65% |
| Normd Weight | 22,05% | 23,87% | 4,48% | 9,59% | 10,91% | 9,79% | 4,61% | 3,50% | 4,22% | 6,97% | 100,00% |

| <i>MONTH&YEAR</i> | <i>AKBNK.E</i> | <i>GARAN.E</i> | <i>HALKB.E</i> | <i>ISCTR.E</i> | <i>KCHOLE</i> | <i>SAHOLE</i> | <i>SISE.E</i> | <i>TAVHLE</i> | <i>VAKBN.E</i> | <i>YKBNK.E</i> | <i>NS BIST 100</i> | Δ NS |
|------------------------------|-----------------------|-----------------------|-----------------------|-----------------------|----------------------|----------------------|----------------------|----------------------|-----------------------|-----------------------|---------------------------|-------------------------------|
| 2012-07 | 0,131 | 0,352 | 0,512 | 0,420 | 0,009 | 0,292 | 0,016 | 0,198 | 0,000 | 0,027 | 0,2 | -0,59 |
| 2012-08 | 0,016 | 0,000 | 0,216 | 0,008 | 0,120 | 0,357 | 0,016 | 0,480 | 0,000 | 0,114 | 0,1 | -0,36 |
| 2012-09 | 0,000 | 0,000 | 0,006 | -0,022 | 0,120 | 0,361 | 0,016 | 0,288 | -0,031 | 0,000 | 0,1 | -0,51 |
| 2012-10 | -0,156 | 0,032 | 0,204 | 0,000 | -0,020 | 0,361 | 0,016 | 0,288 | 0,030 | 0,000 | 0,0 | 5,71 |
| 2012-11 | 0,204 | 0,121 | 0,204 | 0,081 | 0,225 | 0,534 | 0,016 | 0,468 | 0,008 | 0,017 | 0,2 | -0,36 |
| 2012-12 | 0,190 | 0,129 | 0,025 | -0,091 | 0,187 | 0,235 | 0,016 | 0,044 | 0,008 | 0,128 | 0,1 | -0,80 |
| 2013-01 | 0,140 | -0,094 | 0,000 | 0,019 | 0,137 | 0,000 | 0,016 | 0,055 | 0,000 | -0,048 | 0,0 | 3,26 |
| 2013-02 | 0,493 | 0,044 | 0,842 | -0,315 | -0,375 | 0,000 | 0,016 | 0,512 | -0,041 | 0,024 | 0,1 | -0,27 |
| 2013-03 | 0,000 | 0,000 | 0,000 | 0,032 | 0,127 | 0,000 | 0,466 | 0,512 | 0,014 | 0,274 | 0,1 | 1,36 |
| 2013-04 | 0,645 | 0,032 | 0,437 | 0,078 | 0,006 | 0,000 | 0,372 | 0,000 | -0,034 | -0,197 | 0,2 | -0,75 |
| 2013-05 | 0,195 | 0,051 | 0,035 | 0,000 | 0,000 | -0,111 | -0,034 | 0,247 | -0,184 | 0,000 | 0,0 | 1,03 |
| 2013-06 | 0,292 | 0,000 | 0,332 | -0,204 | 0,204 | 0,200 | -0,034 | -0,013 | -0,184 | 0,000 | 0,1 | -0,06 |
| 2013-07 | -0,264 | 0,585 | 0,681 | 0,000 | -0,140 | 0,007 | -0,034 | -0,013 | 0,389 | -0,360 | 0,1 | 1,14 |
| 2013-08 | -0,264 | 0,467 | 0,053 | -0,030 | 0,499 | -0,338 | 0,324 | 0,576 | 0,538 | 0,766 | 0,2 | -1,77 |
| 2013-09 | -0,292 | -0,292 | -0,107 | -0,030 | -0,079 | 0,181 | 0,324 | 0,000 | -0,107 | -0,292 | -0,1 | -0,35 |
| 2013-10 | -0,569 | 0,223 | 0,864 | -0,557 | 0,000 | 0,181 | 0,324 | -0,351 | 0,000 | -0,378 | -0,1 | -3,03 |
| 2013-11 | 0,394 | 0,267 | -0,238 | 0,092 | -0,487 | 0,433 | 0,314 | -0,292 | 0,000 | 0,669 | 0,2 | -0,72 |
| 2013-12 | 0,000 | -0,137 | 0,000 | 0,029 | 0,152 | 0,000 | 0,314 | 0,143 | 0,000 | 0,669 | 0,1 | -0,15 |

3.3.4 BIST 100 industrial

In the second part of thesis, we tested investor sentiment to available regression to include a meaningful indicator.

$$\underline{BIST\ 100\ industrial\ change\ (t)} = 0,012 + (0,017 * \text{industrial production index change (t-3)}) + (0,09 * \text{gold price (ons) (t)}) + E$$

We try to enhance explanatory power with adding investor sentiment variable that has been created according to top ten stock of BIST 100 industrial investor sentiment measured by bloomberg news sentiment. Top ten stock of BIST 100 industrial index according to relative share and their investor sentiment measured by bloomberg news sentiment has been given at below Table 3.32 as limited until the end of 2013.

According to regression results shown at the Table 3.31, Δ BIST 100 industrial news sentiment is not a meaningful indicator for BIST 100 industrial index under 95 % significance level.

So, our final regression including examination of news sentiment

$$\underline{BIST\ 100\ industrial\ change\ (t)} = 0,012 + (0,017 * \text{industrial production index change (t-3)}) + (0,09 * \text{gold price (ons) (t)}) + E$$

Table 3.31 : BIST 100 Industrial – News Sentiment regression result.

| Regression Statistics | |
|-----------------------|-------|
| Multiple R | 0,353 |
| R Square | 0,124 |
| Adjusted R Square | 0,077 |
| Standard Error | 0,046 |
| Observations | 59 |

| ANOVA | | | | | |
|------------|----|-------|-------|-------|----------------|
| | df | SS | MS | F | Significance F |
| Regression | 3 | 0,017 | 0,006 | 2,606 | 0,061 |
| Residual | 55 | 0,118 | 0,002 | | |
| Total | 58 | 0,134 | | | |

| | Coefficients | Standard Error | t Stat | P-value | Lower 95% | Upper 95% | Lower 95,0% | Upper 95,0% |
|--------------|--------------|----------------|--------|---------|-----------|-----------|-------------|-------------|
| Intercept | 0,012 | 0,006 | 1,828 | 0,073 | -0,001 | 0,024 | -0,001 | 0,024 |
| Δ IPI | 0,017 | 0,008 | 2,041 | 0,046 | 0,000 | 0,033 | 0,000 | 0,033 |
| Δ G | 0,092 | 0,049 | 1,879 | 0,066 | -0,006 | 0,189 | -0,006 | 0,189 |
| Δ NS | 0,000 | 0,000 | -0,394 | 0,695 | 0,000 | 0,000 | 0,000 | 0,000 |

Table 3.32 : Δ BIST 100 Industrial NS independent variable.

| | News Sentiment (Original Data) | | | | | | | | | | Total | |
|-----------------------|--------------------------------|---------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|----------------|--|
| Partial Weight | 22,74% | 16,70% | 5,88% | 5,61% | 5,08% | 4,89% | 4,72% | 4,12% | 4,01% | 3,59% | 77,35% | |
| Normd Weight | 29,40% | 21,59% | 7,61% | 7,25% | 6,56% | 6,32% | 6,11% | 5,33% | 5,19% | 4,64% | 100,00% | |

| MONTH&YEAR | EREGL.E | TUPRS.E | AEFES.E | FROTO.E | PETKM.E | KOZAL.E | ULKER.E | ARCLK.E | CCOLA.E | SODA.E | NS BIST 100 | Δ NS |
|-----------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------|--------------------|-------------------------------|
| 2012-07 | 0,431 | -0,427 | -0,035 | 0,006 | -0,445 | -0,445 | -0,038 | -0,471 | 0,000 | 0,000 | -0,1 | -5,01 |
| 2012-08 | 0,431 | 0,416 | 0,211 | 0,382 | -0,445 | -0,445 | -0,038 | 0,204 | 0,000 | 0,000 | 0,2 | 0,11 |
| 2012-09 | 0,431 | 0,416 | 0,211 | 0,037 | -0,029 | 0,512 | -0,038 | -0,522 | 0,000 | 0,000 | 0,2 | -0,09 |
| 2012-10 | 0,554 | 0,186 | 0,000 | -0,310 | -0,075 | 0,512 | 0,103 | 0,000 | 0,000 | 0,000 | 0,2 | 0,50 |
| 2012-11 | 0,554 | 0,321 | -0,604 | 0,491 | 0,204 | 0,512 | 0,103 | 0,562 | 0,322 | 0,000 | 0,3 | -0,22 |
| 2012-12 | 0,554 | 0,321 | -0,604 | 0,491 | -0,461 | 0,512 | 0,178 | 0,000 | 0,322 | 0,000 | 0,3 | -0,35 |
| 2013-01 | 0,554 | -0,414 | 0,108 | 0,491 | 0,110 | 0,063 | 0,178 | 0,000 | 0,445 | 0,000 | 0,2 | 0,94 |
| 2013-02 | 0,667 | 0,445 | 0,108 | 0,877 | -0,677 | 0,063 | 0,178 | -0,805 | 0,445 | 0,000 | 0,3 | -0,17 |
| 2013-03 | 0,421 | 0,306 | -0,210 | -0,322 | 0,716 | 0,063 | 0,156 | 0,480 | 0,479 | 0,000 | 0,3 | -0,85 |
| 2013-04 | 0,113 | -0,198 | 0,000 | -0,526 | 0,716 | 0,063 | 0,156 | 0,480 | 0,000 | 0,000 | 0,0 | -1,17 |
| 2013-05 | 0,256 | -0,387 | -0,413 | 0,448 | 0,459 | -0,550 | 0,156 | -0,590 | 0,524 | 0,000 | 0,0 | -26,57 |
| 2013-06 | 0,343 | 0,372 | -0,413 | 0,448 | 0,459 | -0,550 | 0,156 | -0,590 | 0,256 | 0,000 | 0,2 | -0,99 |
| 2013-07 | 0,343 | -0,307 | -0,263 | -0,101 | 0,459 | -0,550 | 0,156 | -0,590 | 0,415 | 0,000 | 0,0 | 17,13 |
| 2013-08 | 0,000 | -0,070 | 0,000 | 0,648 | 0,570 | -0,550 | 0,928 | -0,718 | -0,302 | 0,000 | 0,0 | 3,97 |
| 2013-09 | 0,512 | -0,070 | 0,000 | 0,648 | 0,570 | -0,550 | 0,258 | -0,718 | 0,434 | 0,000 | 0,2 | -0,46 |
| 2013-10 | 0,512 | -0,070 | 0,000 | -0,051 | 0,570 | -0,550 | 0,059 | -0,718 | 0,014 | 0,000 | 0,1 | -0,01 |
| 2013-11 | 0,548 | 0,080 | -0,722 | -0,205 | 0,505 | -0,709 | 0,107 | 0,615 | -0,722 | 0,000 | 0,1 | 0,85 |
| 2013-12 | 0,548 | 0,080 | -0,722 | 0,352 | 0,505 | -0,016 | 0,107 | 0,615 | -0,722 | 0,000 | 0,2 | 0,34 |

3.3.5 BIST 100 Technology

In the second part of thesis, we tested investor sentiment to available regression to include a meaningful indicator.

$$\underline{BIST\ 100\ technology\ change\ (t)} = 0,031 + (0,07 * \text{commercial bank funding rate change (t-1)}) + (-0,495 * \text{currency basket change (t)}) + E$$

We try to enhance explanatory power with adding investor sentiment variable that has been created according to top ten stock of BIST 100 technology investor sentiment measured by bloomberg news sentiment. Top ten stock of BIST 100 technology index according to relative share and their investor sentiment measured by bloomberg news sentiment has been given at below table 3.34 as limited until the end of 2013.

According to regression results at the Table 3.33, Δ BIST 100 technology news sentiment is not a meaningful indicator for BIST 100 technology index under 95 % significance level.

So, our final regression including examination of news sentiment

$$\underline{BIST\ 100\ technology\ change\ (t)} = 0,031 + (0,07 * \text{commercial bank funding rate change (t-1)}) + (-0,495 * \text{currency basket change (t)}) + E$$

Table 3.33 : BIST 100 Technology – News Sentiment regression result.

| <i>Regression Statistics</i> | |
|------------------------------|--------|
| Multiple R | 0,501 |
| R Square | 0,251 |
| Adjusted R Square | 0,211 |
| Standard Error | 0,067 |
| Observations | 61,000 |

| <i>ANOVA</i> | | | | | |
|--------------|-----------|-----------|-----------|----------|-----------------------|
| | <i>df</i> | <i>SS</i> | <i>MS</i> | <i>F</i> | <i>Significance F</i> |
| Regression | 3 | 0,086 | 0,029 | 6,363 | 0,001 |
| Residual | 57 | 0,256 | 0,004 | | |
| Total | 60 | 0,341 | | | |

| | <i>Coefficients</i> | <i>Standard Error</i> | <i>t Stat</i> | <i>P-value</i> | <i>Lower 95%</i> | <i>Upper 95%</i> | <i>Lower 95,0%</i> | <i>Upper 95,0%</i> |
|---------------|---------------------|-----------------------|---------------|----------------|------------------|------------------|--------------------|--------------------|
| Intercept | 0,032 | 0,009 | 3,443 | 0,001 | 0,013 | 0,050 | 0,013 | 0,050 |
| Δ CBFR | 0,075 | 0,034 | 2,193 | 0,032 | 0,006 | 0,143 | 0,006 | 0,143 |
| Δ CB | -0,493 | 0,139 | -3,551 | 0,001 | -0,770 | -0,215 | -0,770 | -0,215 |
| Δ NS | -0,002 | 0,002 | -0,961 | 0,341 | -0,005 | 0,002 | -0,005 | 0,002 |

Table 3.34 : Δ BIST 100 Technology NS independent variable.

| | News Sentiment (Original Data) | | | | | | | | | | Total |
|-----------------------|--------------------------------|---------------|--------------|--------------|--------------|--------------|--------------|---------------|--------------|--------------|----------------|
| Partial Weight | 2,61% | 71,81% | 1,27% | 2,75% | 2,31% | 1,89% | 1,30% | 9,96% | 2,40% | 1,33% | 97,64% |
| Normd Weight | 2,68% | 73,54% | 1,31% | 2,82% | 2,36% | 1,94% | 1,33% | 10,20% | 2,46% | 1,36% | 100,00% |

| MONTH&YEAR | ALCTL.E | ASELS.E | FONET.E | INDES.E | KAREL.E | KFEIN.E | KRONT.E | LOGO.E | NETAS.E | SMART.E | NS BIST 100 | Δ NS |
|-----------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------|----------------|----------------|--------------------|-------------------------------|
| 2012-07 | 0,000 | -0,572 | 0,000 | 0,124 | 0,000 | 0,000 | 0,107 | 0,132 | 0,300 | 0,000 | -0,4 | 0,00 |
| 2012-08 | 0,000 | -0,572 | 0,000 | 0,124 | 0,000 | 0,000 | 0,107 | 0,132 | 0,300 | 0,000 | -0,4 | 0,00 |
| 2012-09 | 0,000 | -0,572 | 0,000 | 0,124 | 0,000 | 0,000 | 0,107 | 0,132 | 0,300 | 0,000 | -0,4 | 0,00 |
| 2012-10 | 0,000 | -0,572 | 0,000 | 0,124 | 0,000 | 0,000 | 0,107 | 0,132 | 0,300 | 0,000 | -0,4 | 0,00 |
| 2012-11 | 0,000 | -0,572 | 0,000 | 0,124 | 0,000 | 0,000 | 0,107 | 0,132 | 0,300 | 0,000 | -0,4 | -1,89 |
| 2012-12 | 0,000 | 0,445 | 0,000 | 0,124 | 0,000 | 0,000 | 0,107 | 0,132 | 0,300 | 0,000 | 0,4 | 0,00 |
| 2013-01 | 0,000 | 0,445 | 0,000 | 0,124 | 0,000 | 0,000 | 0,107 | 0,132 | 0,300 | 0,000 | 0,4 | -0,87 |
| 2013-02 | 0,000 | 0,040 | 0,000 | 0,124 | 0,000 | 0,000 | 0,107 | 0,132 | 0,000 | 0,000 | 0,0 | -12,73 |
| 2013-03 | 0,000 | -0,787 | 0,000 | 0,213 | 0,000 | 0,000 | 0,107 | 0,132 | 0,000 | 0,000 | -0,6 | -1,30 |
| 2013-04 | 0,000 | 0,209 | 0,000 | 0,000 | 0,000 | 0,000 | 0,107 | 0,132 | 0,000 | 0,000 | 0,2 | 0,00 |
| 2013-05 | 0,000 | 0,209 | 0,000 | 0,000 | 0,000 | 0,000 | 0,107 | 0,132 | 0,000 | 0,000 | 0,2 | 0,00 |
| 2013-06 | 0,000 | 0,209 | 0,000 | 0,000 | 0,000 | 0,000 | 0,107 | 0,132 | 0,000 | 0,000 | 0,2 | 0,00 |
| 2013-07 | 0,000 | 0,209 | 0,000 | 0,000 | 0,000 | 0,000 | 0,107 | 0,132 | 0,000 | 0,000 | 0,2 | -0,91 |
| 2013-08 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,107 | 0,132 | 0,000 | 0,000 | 0,0 | 0,00 |
| 2013-09 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,107 | 0,132 | 0,000 | 0,000 | 0,0 | 0,00 |
| 2013-10 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,107 | 0,132 | 0,000 | 0,000 | 0,0 | 12,88 |
| 2013-11 | 0,000 | 0,260 | 0,000 | 0,000 | 0,000 | 0,000 | 0,107 | 0,132 | 0,000 | 0,000 | 0,2 | -0,39 |
| 2013-12 | 0,000 | 0,151 | 0,000 | 0,000 | 0,000 | 0,000 | 0,107 | 0,132 | 0,000 | 0,000 | 0,1 | 1,35 |



4. RESULTS

4.1 Effects of Macroeconomic Indicators on Stock Returns at BIST

At the first phase of our thesis we looked for the answers of our research questions at below.

R.Q.1: Do macroeconomic indicators have material and significant effects on stock indexes ?

R.Q.2: Which macroeconomic indicators effect which indexes? Is there available any differentiation?

R.Q.3: What is the time lag of each indicators' effect on stock indexes?

According to our analysis over 74 months between July 2012 and August 2018, we find the responses of research questions and created regression formulas that able to explain variations for related BIST index from 12,20 % to 33,40 %.

Five macroeconomic indicators, industrial production index, commercial banks funding rate, currency basket, gold price, M2 money supply have material and powerful effect on BIST 100 index returns at 95 % significance level.

Producer Price Index, Brent Oil (USD) and Copper (USD) price level change has no material and powerful effect on examined BIST 100 indexes at 95 % significance level.

M2 Money Supply of Central Bank of Turkey, Currency Basket and Gold Price are the fastest reactor for BIST 100 index change. That three macroeconomic indicator effects BIST 100 indexes as soon as they have been declared.

Effects on Industrial Production Index on BIST 100 index have been realized with at least two months' time lag.

M2 money Supply of Central Bank of Turkey and currency basket changes have negative way relationship with BIST 100 index returns.

Industrial Production Index, Gold Price and Commercial Bank Funding Rates have positive relationship with BIST 100 index returns.

Our final regressions R2 values shown at Table 3.9 indicates that micro analysis factors are monumental effect on investor decision too besides of macroeconomic indicators.

Table 3.9 : BIST 100 – macroeconomic variables final regression table.

| | Δ BIST 100 | Δ BIST 100 | Δ BIST 100 | Δ BIST 100 | Δ BIST 100 |
|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| | TOTAL | SERVICE | FINANCIAL | INDUSTRIAL | TECHNOLOGY |
| t Δ IPI | | | | | |
| t-1 Δ IPI | | | | | |
| t-2 Δ IPI | (+) | | | | |
| t-3 Δ IPI | | | (+) | (+) | |
| t Δ CBFR | | | | | |
| t-1 Δ CBFR | | (+) | | | (+) |
| t-2 Δ CBFR | | | | | |
| t-3 Δ CBFR | | | | | |
| t Δ CB | (-) | | | | (-) |
| t-1 Δ CB | | | | | |
| t-2 Δ CB | | | | | |
| t-3 Δ CB | | | | | |
| t Δ G | | | (+) | (+) | |
| t-1 Δ G | | | | | |
| t-2 Δ G | | | | | |
| t-3 Δ G | | | | | |
| t Δ M2 | (-) | (-) | (-) | | |
| t-1 Δ M2 | | | | | |
| t-2 Δ M2 | | | | | |
| t-3 Δ M2 | | | | | |
| R Square | 33,40% | 23,60% | 30,40% | 12,20% | 23,90% |

4.2 Effects of Macroeconomic Indicators & Google SVI on Stock Returns at Borsa Istanbul

At the second phase of our thesis we looked for the answer of our research questions at below.

R.Q.4: Does Investor attention turn into transaction on trade desk as buy or sell immediately, thereby Is it an important indicators to stock returns?

Investor attention has been measured with google svi monthly changes of each index calculated by partial weight of top ten stocks. We make assumption that google SVI is directly correlated with investor attention to stocks and effects the trading of that stock in positive / negative way dependent on calculated google SVI. We calculated unique investor attention indicator taking into consideration of partial weights on related index. Underlying assumptions in there, firstly each index investor attention mainly led by stocks whose parital weight is much more higher than others. Secondly, investor attention for each stock convert into transaction on the desk in the same degree. But in reality, It is question mark that two stocks , has the same investor attention +0,8 , will move in same way with same percentage.

According to our analysis, we could not find meaningful contribution of investor attention to index returns at 95 % signifacance level. But, For BIST 100 total index analysis, top ten stocks has the 68,05 % relative weight of BIST 100 total, investor attention is significant variable for predicting stock returns at 90 % significance level. Even if top ten stocks have the higher representative power in other index, It was the only at same security level. It can be easily inferred that BIST 100 total index has higher homogeneity from the side of stock extention. Moreover, BIST 100 total index has been classified according to highest outstanding capital (Url-8). We can inferred that higher outstanding capital companies news on the channel is by far any marginality and has been taken into account by investors.

4.3 Effects of Macroeconomic Indicators & Google SVI & News Sentiment on Stock Returns at Borsa Istanbul

At the last phase of our thesis we looked for the answer of our research questions at below.

R.Q.5: Does investor sentiment turn into transaction on trade desk as buy or sell immediately, thereby Is it an important indicators to stock returns?

Investor sentiment has been measured with bloomberg news sentiment monthly changes of each index calculated by partial weight of top ten stocks. We make assumption that news sentiment is directly correlated with investor sentiment and effects the trading of that stock in positive / negative way dependent on calculated news sentiment. We calculated unique investor sentiment indicator taking into consideration of partial weights on related index. Underlying assumptions in there, firstly each index investor sentiment mainly led by stocks whose parital weight is much more higher than others. Secondly, investor sentiment for each stock convert into transaction on the desk in the same power. But in reality it is qestion mark that two stocks , has the same investor sentiment -0,4 , will move in same way with same percantage.

According to our analysis, we find meaningful contribution of investor sentiment to BIST 100 total index returns at 95 % signifacance level even if analyzed stocks has less representative power than other index with 68,05 %. We may see it from Table 3.10, Table 3.11, Table 3.12, Table 3.13 and Table 3.14. It can be easily inferred that BIST 100 total index has higher homogeneity from the side of stock extention. Moreover, BIST 100 total index has been classified according to highest outstanding capital (Url-8). We can inferred that investors are more likely to transform their sentiment into transaction in trade desk via buy or sell and market efficieny is higher at BIST 100 total compared to other BIST 100 index.

In this last phase of our incremental methodology employing macroeconomic variables, google svi and bloomberg news sentiment, we are able to explain variaties several BIST index from 44,50 % to 12,20 % as seen the below Table 3.34 and our final regression forlumas have been given at below;

$$\Delta\text{BIST 100 Total (t)} = 0,018 + (0,018 * \Delta\text{IPI (t-2)}) + (0,057 * \Delta\text{CBFR (t-2)}) - (0,267 * \Delta\text{CB (t)}) + (-0,654 * \Delta\text{M2 (t)}) + (0,001 * \Delta\text{NS (t)}) + E$$

$$\Delta\text{BIST 100 Service (t)} = 0,017 + (0,055 * \Delta\text{CBFR (t-1)}) + (-0,78 * \Delta\text{M2 (t)}) + E$$

$$\Delta\text{BIST 100 Financial (t)} = 0,016 + (0,017 * \Delta\text{IPI (t-3)}) + (0,13 * \Delta\text{G (t)}) + (-1,00 * \Delta\text{M2 (t)}) + E$$

$$\Delta\text{BIST 100 Industrial (t)} = 0,012 + (0,017 * \Delta\text{IPI (t-3)}) + (0,09 * \Delta\text{G (t)}) + E$$

$$\Delta\text{BIST 100 Technology (t)} = 0,031 + (0,07 * \Delta\text{CBFR (t-1)}) + (-0,495 * \Delta\text{CB (t)}) + E$$



Table 3.35 : BIST 100 – macroeconomic variables & google SVI & bloomberg news sentiment final regression table.

| | | Δ BIST 100 | Δ BIST 100 | Δ BIST 100 | Δ BIST 100 | Δ BIST 100 |
|-----------------|---|-------------------|-------------------|-------------------|-------------------|-------------------|
| | | TOTAL | SERVICE | FINANCIAL | INDUSTRIAL | TECHNOLOGY |
| t-2 | Δ IPI | (+) | | | | |
| t-3 | Δ IPI | | | (+) | (+) | |
| t-1 | Δ CBFRR | | (+) | | | (+) |
| t-2 | Δ CBFRR | (+) | | | | |
| t | Δ CB | (-) | | | | (-) |
| t | Δ G | | | (+) | (+) | |
| t | Δ M2 | (-) | (-) | (-) | | |
| R Square | Macroeconomic variables | 33,40% | 23,60% | 30,40% | 12,20% | 23,90% |
| R Square | Macroeconomic variables & google SVI | 33,40% | 23,60% | 30,40% | 12,20% | 23,90% |
| t | Δ NS | (+) | | | | |
| R Square | Macr. Var. & google SVI & bloomberg news sentiment | 44,50% | 23,60% | 30,40% | 12,20% | 23,90% |

5. CONCLUSION

The main purpose of this thesis is to create a methodology for investors that is not only statistically significant but also economically beneficial to be used in stock investment decisions, which works in real life into profitable returns.

In the first phase of this thesis, we employ eight different macroeconomic indicators and analyze their effects on different BIST indices. We find that the industrial production index, commercial banks funding rate, currency basket, gold price, and M2 money supply of TCB have a material and powerful effect on BIST 100 index returns at a 95% significance level, while the producer price index, Brent oil (USD) and copper (USD) price level changes have no material and powerful effect. As seen in Table 3.34, each BIST 100 index has been affected by different macroeconomic variables. The industrial production index, commercial bank funding rate, currency basket, and M2 money supply of TCM are indicators for the BIST 100 total index, while the commercial bank funding rate and M2 money supply of TCM are indicators for the BIST 100 service index. The industrial production index, gold price, and M2 money supply of TCM are indicators for the BIST 100 financial index, while the industrial production index and gold price are indicators for the BIST 100 industrial index. The commercial bank funding rate and currency basket are indicators for the BIST 100 technology index. Outstandingly and contrary to other emerging market studies, the currency basket has a negative impact on stock returns. Kabir et al. (2014) researched the Malaysia stock market, taking into consideration the time scope between 1991-2010 and concluded that exchange rates are the strongest indicator of the stock market and have a positive relationship due to export-driven economies which yield relatively cheap products in the global market and increase sales and operational profitability. On the contrary of this finding, our study shows that BIST 100 total and BIST 100 technology companies cannot exploit higher exchange rates to get higher market share globally and are not able to transform into investor attention through buying a stock. It can also be inferred that export-driven technology

index, relative weight of Aselsan is 71,80 %, has the negatively effected from increase in currency basket. It can be infered indirectly that BIST 100 Technology index companies competitive advantage in the global market is not mainly resulted from cost leadership. Our findings on M2 money supply of central bank confirms the literature about matrail effect on stock market. It is apperant that the direction of effect has changed according to economic level of country; developed, emerging, undeveloped. Flannery and Protopapadakis (2002) reveled the positive effect of aggregate money supply positive effect on stock market of United States. Our findings shows that money supply has negative impact on index returns. We may infer that money supply can flow more easily to financial market in developed counties, related with capitalism – earning money over money while money supply does not show itself as feeding to stock market. From the economical perspective, money supply is related with economical growth of countries and it is enhanced the times that economic activity increased and available money supply does not meet requirements or economic depression times to support liquidity needs of household and companies. In that case, we can indicate that anyhow of this two possiblities, It is more healthy to acquainted with negative relationship between money supply and stock market. It is indicator that additional money supply does not flow to financial market may create bubbles in the future. It is more aptly travel through real economy dynamics. One exception, specific to BIST 100 financial index , It is negatively effected by M2 money supply as expected lower rate of financing cost thereby shrink on the spread of funding rate and financing rate. On the other hand industrial production index has positively correlated with BIST 100 financing index due to the linkage of growth of companies and financing needs. Incremential financing needs increase profitability of financial companies. Analyzing time effect of indicators to BIST index, M2 money supply of Central Bank of Turkey, currency basket and gold price are the fastest reactor for BIST 100 index changes. That three macroeconomic indicator effects BIST 100 indexes as soon as they have been declared. Effects on industrial production index on BIST 100 indexes has been realized with at least two months' time lag. It is very cosistent that direction of macroeconomic indicators are the same denomination as positive or negative for all index.

In the second phase of thesis, available models consist of different macroeconomic variables and specifically determined for each BIST index, enhanced with investor attention variable, google SVI upon available model. According to results investor attention measured by google SVI is not a meaningful indicator for BIST 100 index returns at 95 % significance level. That result broke our assumptions out. Firstly, investor's abnormal search does not turn into action in trading desk through buy or sell. Secondly, investor attention is differ from stock to stock and it may be wrong to build up investor attention variable based on partial weight of stocks in index as we applied in our model. Taking into consideration of short notice period scope of investor attention, monthly change may stay ahead of its nature. Corroboratively Da et al. (2011) indicated that abnormal search volume index yields short term, countable with days, higher returns and follow the profit realization in long scope.

In the last phase of thesis, investor sentiment has been included to our model in incremental way by using bloomberg investor sentiment. According to analysis result, investor sentiment measured by bloomberg search volume index is a meaningful indicator for BIST 100 total index returns at 95 % significance level. It is expected to get higher explanatory power result from other BIST 100 index compared to BIST 100 total index because of higher representativeness of index with top ten stock relative weight. But, we could not able to get it. Investor sentiment appears a significant indicator for only BIST 100 total index. It can be easily inferred that BIST 100 total index has higher homogeneity from the side of stock extension. Moreover, BIST 100 total index has been classified according to highest outstanding capital. So, it means that investors are more likely to transform their sentiment into transaction in trade desk via buy or sell. It can be indicated that market efficiency is higher at BIST 100 total compared to other BIST 100 index. Seng and Yang (2017) created a model combining news sentiments and five financial report indicators include EPS, ROA, ROE, BPS, PB to measure stock price return change over monthly, quarterly and semi annual period. The results confirms that news sentiment is positively effect the stock price returns and volatility.

5.1 Further Discussion

In the model, macroeconomic indicators, investor attention and investor sentiment has been combined in an incremental way and their effects to several BIST index has been examined over monthly changes. We designed the model assuming investor attention and investor sentiment is the direct result of irrational behaviors main motivators and company specific microeconomic variables associated with it. Even if investor attention and investor sentiment scope is daily basis, we combine them with macroeconomic variables' monthly scope to analyze in one model. In the future, the model may be extended with daily basis analysis with considering only investor attention and investor sentiment. To compare the results of similar economies, the research may be enhanced with several emerging countries. Moreover, we created unique investor attention and investor sentiment variables using top ten index stocks' individual data. Relative weight has been considered and use as indicative. On the daily basis analysis, specific stock base models can be created.

REFERENCES

Ariely, Dan (2010). *Akıldışı ama öngörülebilir* (Mert Akcanbaş, Çev.). İstanbul: Destek yayınları.

Ariely, D., Loewenstein, G., Prelec, D. (2003). Coherent arbitrariness: stable demand curves without stable preferences. *The Quarterly Journal of Economics*, Vol. 118, No. 1, 73-105.

Ariely, D., Loewenstein, G., Prelec, D. (2006), Coherent arbitrariness: stable demand curves without stable preferences. *The Quarterly Journal of Economics*, Vol. 118, No. 1, 73-105.

Barber, B. M., and Odean, T. (2008). All that glitters: The effect of attention and news on the buying behavior of individual and institutional investors. *Review of Financial Studies*, 21 (2), 785-818.

Bayar, Y. (2016). Macroeconomic determinants of stock market development: evidence from Borsa İstanbul. *Financial Studies*, Vol. 20 No. 1, 69-89.

Bernoulli, Daniel (1954). "Exposition of a New Theory on the Measurement of Risk", *Econometrica*, Vol. 22, No. 1. 23-36.

Berstein, Peter L., (2016). *Tanrılara karşı, Riskin olağanüstü tarihi*(Canan Feyyat, Çev.), İSTANBUL: Scala yayıncılık.

Bondia, R., Biswal, P., C., Panda, A. (2019). The unspoken facets of buying by individual investors in indian stock market. *Review of Behavioral Finance*, Vol. 11, No. 3, 324-351.

Boyd, J.H., Levine, R. and Smith, B.D. (2001), The impact of inflation on financial market performance. *Journal of Monetary Economics*, Vol. 47 No. 2, 221-248.

Budsayaplakorn S.,Dibooglu S., Mathur I. (2010). Can Macroeconomic Indicators Predict a Currency Crisis? Evidence from Selected Southeast Asian Countries, *Emerging Markets Finance & Trade*, Vol. 46, 5-21.

Chang, B.H. , Meo, M.S., Syed, Q.R. and Abro, Z. (2019). Dynamic analysis of the

relationship between stock prices and macroeconomic variables, *South Asian Journal of Business Studies*, Vol. 8, No. 3, 229-245.

Cherif, M. and Gazdar, K. (2010). Macroeconomic and institutional determinants of stock market development in MENA region: new results from a panel data analysis. *International Journal of Banking and Finance*, Vol. 7, No. 1, 139-159.

Da, Z., Engelberg, J., Gao, P. (2011). In search of attention. *The Journal of Finance*, Vol. 66, No. 5, 1461-1499.

De Long, J. B., Shleifer, A., Summers, L. H., and Waldmann, R. J. (1990). Noise trader risk in financial markets. *Journal of Political Economy*, 98 (4), 703-738.

Dong, D., Wu, K. (2020). Investor attention is a risk pricing factor? Evidence from Chinese investors for self-selected stocks. *China Finance Review International*, Vol. 10, No. 1, 95-112.

Fama, E. F. (1970). Efficient capital markets: A review of theory and empirical work. *Journal of Finance*, 25 (2), 383-417.

Fama, E.F. (1981). Stock Returns, Real Activity, Inflation and Money, *American Economic Review* 11: 545-565.

Fama, E.F. (1990). Stock prices, expected prices and real activity, *Journal of Finance*, Vol. 45, No. 4, 1080-1089.

Fama, E. F., and French, K. R. (1993). Common risk factors in the returns on stocks and bonds, *Journal of Financial Economics*, 33 (1), 3-56.

Fang, L., and Peress, J. (2009). Media coverage and the cross- section of stock returns. *Journal of Finance*, 64 (5), 2023-2052.

Flanery, M.J., Protopapadakis, A.A. (2002). Macroeconomic factors do influence aggregate stock returns. *The review of Financial Studies*, Vol. 15, No. 3, 751-782.

Gallea, A.M., Patalon, W. (2016). *Karşıt Yatırım* (Ali Perşembe, Çev.). İstanbul: Scala Yayıncılık.

Gennaioli, N., Shleifer, A. (2018). A crisis of beliefs. Retrieved from https://www.jstor.org/stable/j.ctvc77dv1?turn_away=true.

Gervais, S., Odean, T. (2001). Learning to be overconfident. *The Review of Financial Studies*, Vol. 14, No. 1, 1-27

- Gignac, G., Vernon P.A., Wickett, J.C.** (2003). Factors influencing the relationship between brain size and intelligence. *The Scientific Study of General Intelligence*, 93–106.
- Gordon, M.J.** (1962). The saving, investment and valuation of a corporation, *Review of Economics and Statistics*, Vol. 44, No.1, 37-51
- Goldberg, Elkhonon** (2006). *The Wisdom Paradox*, Avery, doi: 1592401872.
- Hirshleifer, D., and Teoh, S. H.** (2003). Limited attention, information disclosure, and financial reporting. *Journal of Accounting and Economics*, 36 (1-3), 337-386.
- Kabir, S.H., Bashar, O.K., Masih, M.** (2014). Is domestic stock price cointegrated with exchange rate and foreign stock price?. *The Journal of Developing Areas*, Vol. 48, No. 3, 285-302
- Kahneman, D.** (1973). *Attention and Effort*. Englewood Cliffs, NJ: Prentice-Hall.
- Kahneman, D., Tversky, A.** (1979). Prospect theory: an analysis of decision under risk. *Econometrica* V. 47 No. 2, 263-291.
- Kent, D.D., Hirshleifer, S., Subrahmanyam, A.** (2001). Overconfidence, arbitrage, and equilibrium asset pricing. *The Journal of Finance*, Vol.56, No.3, 921-965.
- Keynes, J.M.** (1936). The general theory of money, interest and employment. Retrieved from <https://political-economy.com/general-theory-of-employment-interest-and-money>
- Kim, S.J. and Wu, E.** (2008). Sovereign credit ratings, capital flows and financial sector development in emerging markets. *Emerging Markets Review*, Vol. 9, No. 1, 17-39.
- Knight, F.H.** (1964). *Risk, uncertainty & profit*. New York: Century Press.
- Kutan, A.M. and Aksoy, T.** (2003). Public information arrival and the Fisher effect in emerging markets: evidence in stock and bond markets in Turkey. *Journal of Financial Services Research*, Vol. 23, No. 3, 225-239.
- Le Bon, Gustave** (2018). *Kitlelerin Psikolojisi*, İstanbul: Koridor yayıncılık.
- Lee, B.S.** (1992). Causal relations among stock returns, interest rates, real activity and inflation. *The Journal of Finance* Vol.47, No.4, 1591-1603.
- Leibowitz, J., Chan, Y., Jenkin, T., Spicker, D., Paliszkievicz, J., Babiloni, F.** (2019). If numbers could “feel”: How well do executives trust their intuition?. *Journal of Information and Knowledge Management Systems* Vol. 49 No. 4, 531-545.

- Lou, D** (2014). Attracting Investor Attention through Advertising. *The review of Financial Studies*, Vol. 27, No. 6, 1797-1829.
- Malik, I.A. and Amjad, S.** (2013). Foreign direct investment and stock market development in Pakistan. *Journal of International Trade Law and Policy*, Vol. 12, No. 3, 226-242.
- Margoshes, S.L.** (1961). Present Value Techniques of Stock Valuation. *Financial Analysts Journal*, Vol. 17, No. 2, 37-42.
- Marques, L.M., Fuinhas, J.A. and Marques, A.C.** (2013). Does the stock market cause economic growth? Portuguese evidence of economic regime change. *Economic Modelling*, Vol. 32, 316-324.
- Markowitz, H.** (1952). Portfolio selection. *Journal of Finance*, 7 (1), 77-91.
- Miller, T.I.** (1989). Gut-Level Decisionmaking: Implications for Public Policy Analysis. *Journal of Policy Analysis and Management*, Vol. 8, No. 1, 119-125
- Mukherjee, T.K., and A. Naka.** (1995). Dynamic relations between macroeconomic variables and the Japanese stock markets: an application of a vector error correction model. *Journal of Financial Research*, Vol. 18, No. 2, 223-237
- Miller, T.I.** (1989). Gut-Level Decisionmaking: Implications for Public Policy Analysis
- Nasseri, A. A., Tucker A., de Cesare S.** (2014). *Big Data Analysis of StockTwits to Predict Sentiments in the Stock Market*. In: Džeroski S., Panov P., Kocev D., Todorovski L. (eds) Discovery Science. DS 2014. Lecture Notes in Computer Science, vol 8777. Springer, Cham
- Neal, J.R., Kathleen, D., V.** (2012). Hindsight bias, *Perspectives on Psychological Science*, Vol. 7, No. 5, 411-426
- Patelis, A.D.** (1997). Stock Return Predictability and The Role of Monetary Policy. *The Journal of Finance*, Vol. 52, No.5, 1951-1972
- Rickards, James** (2019). *Çöküşe giden yol* (Mert Akcanbaş, Çev.). İstanbul: Destek yayınları.
- Ross, S.A.** (1976). The Arbitrage Theory of Capital Asset Pricing. *Journal of Economic Theory* 13, 341-360.
- Seasholes, Mark S., and Guojun Wu.** (2007). Predictable behavior, profits, and attention. *Journal of Empirical Finance* 14, 590-610.

- Seng, J.L., Yang, H.F.** (2017). The association between stock price volatility and financial news – a sentiment analysis approach. *Kybernetes, Vol. 46, No. 8*, 1341-1365
- Seybert, N., Bloomfield, R.** (2009). Contagion of Wishful Thinking in Markets. *Management Science, Vol. 55, No. 5*, 738-751
- Sharpe, W. F.** (1964). Capital asset prices: A theory of market equilibrium under conditions of risk. *Journal of Finance, 19 (3)*, 425-442.
- Shi, R., Xu, Z., Chen, Z., Huang, J.** (2012). Does attention affect individual investors' investment return?. *China Finance Review International, Vol. 2, No. 2*, 143-162.
- Sicherman, N., Loewenstein, G., Seppi, D.J., Utkus, S.P.** (2016). Financial attention. *The Review of Financial Studies, Vol. 29, No. 4*, 863-897.
- Simakova, J., Stravarek, D., Prazak, T., Ligočka, M.** (2019). Macroeconomic factors and stock prices in the food and drink industry, *British Food Journal Vol. 121, No. 7*, 1627-1641
- Sukruoglu, D. and Nalin, H.T.** (2014). The macroeconomic determinants of stock market development in selected European countries: dynamic panel data analysis. *International Journal of Economics and Finance, Vol. 6, No. 3*, 64-71
- Sun, Y., Fang, M. Wang, X.** (2018). A novel stock recommendation system using Guba sentiment analysis, *Personal and Ubiquitous Comput 22*, 575-587
- Takamatsu, R.T., Favero, L.P.L.** (2019). Financial indicators, informational environment of emerging markets and stock returns. *RAUSP Management Journal Vol. 54 No.3*, 253-268
- Tan, S., D., and Taş, O.** (2018). Investor attention and stock returns: Evidence from Borsa Istanbul. *Borsa Istanbul Review 19-2*, 106-116
- Uygur, U., and Taş, O.** (2014). The impacts of investor sentiment on returns and conditional volatility of international stock markets. *Quality and Quantity, 48 (3)*, 1165-1520
- Xu, Q., Wang, L., Jiang, C., Liu, Y.** (2019). A novel (U)MIDAS-SVR model with multi-source market sentiment for forecasting stock returns. *Neural Computing and Applications 32*, 5875-5888
- Url-1** < <https://twitter.com> >, date retrieved 04.11.2019.
- Url-2** < <https://stocktwits.com> >, date retrieved 04.11.2019.

Url-3 < <https://www.bloomberg.com/company/press/trending-on-twitter-social-sentiment-analytics> >, date retrieved 06.11.2019.

Url-4 < <https://www.bloomberg.com/professional/sentiment-analysis-white-papers/> >, date retrieved 12.02.2020.

Url-5 < <http://www.tuik.gov.tr/UstMenu.do?metod=kategorist>>, date retrieved 01.12.2019.

Url-6 < <https://evds2.tcmb.gov.tr> >, date retrieved 01.12.2019.

Url-7 < <https://www.borsaistanbul.com/en/indices/bist-stock-indices>>, date retrieved 12.02.2020.

Url-8 < <https://www.borsaistanbul.com/sss/endeksler>>, date retrieved 01.04.2020.

CURRICULUM VITAE

Name Surname: Zekeriya Bildik

Place and Date of Birth : Karabuk, 12.07.1986

E-Mail : zekeriya.bildik@gmail.com

EDUCATION :

- **B.Sc. :** 2009, Istanbul Technical University, Faculty of Management

PROFESSIONAL EXPERIENCE AND REWARDS:

- 2019- present, Mahle, Controlling Manager
- 2016-2019, Ferrero, Industrial Controller
- 2014-2016, ZF Friedrichshafen, Financial Controller
- 2011-2014, VW Turkey, Finance Specialist
- CMA, 2015
- DIPIFR, 2018
- CSCA, 2017

PUBLICATIONS, PRESENTATIONS AND PATENTS

- **Bildik, Z.**, Controlling Role' s Challenges in Turbulent Economies, Controller Summit 2016, Boston, USA
- **Bildik, Z.** (2015), Currency Wars and Effects on Global Economy, 7th International Finance Conference- Tallinn, Estonia