AN INVESTIGATION ON THE NATURE OF THE IDIOSYNCRATIC RISK OF STOCK PORTFOLIOS

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ABSTRACT

AN INVESTIGATION ON THE NATURE OF THE IDIOSYNCRATIC RISK OF STOCK PORTFOLIOS

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In this study, based on sound economic theories, two economic transmission channels are identified to investigate the impacts of changes in funding liquidity conditions in interbank loan markets and the reserve currency (US dollar) value on the idiosyncratic portfolio-level risks. Controlling for business cycles, we find that a deterioration in funding liquidity conditions increases the idiosyncratic risk of high-risk portfolios more than that of less risky portfolios. This increase is stronger when the idiosyncratic risks contain uncertainty information about major financial and commodity markets. Furthermore, similar to this finding, the idiosyncratic risk of portfolios (especially the high-risk ones) is considerably enhanced by the increases in US dollar value against major foreign currencies when uncertainty about the major markets is taken into consideration.

Keywords: Funding liquidity, reserve currency, idiosyncratic risk, uncertainty

ÖZ

HİSSE SENEDİ PORTFÖYLERİNİN KENDİNE ÖZGÜ RİSKLERİNİN DOĞASI ÜZERİNE BİR ARAŞTIRMA

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Bu çalışmada, güçlü ekonomik teorilere dayalı olarak, bankalar arası piyasalardaki fonlama likidite koşulları ve rezerv para birimi (ABD doları) değeri değişimlerinin portföy seviyesinde kendine özgü risklerin üzerindeki etkilerini araştırmak için iki ekonomik yayılma kanalı tanımlanmıştır. Konjönktür dalgalanmalarını kontrol ederek, fonlama likidite koşullarındaki bozulmanın yüksek riskli portföylerin kendine özgü risklerini daha az riskli portföylerin kendine özgü risklerinden daha fazla arttırdığını gösterdik. Bu artış, kendine özgü riskler başlıca finansal ve emtia piyasaları ile ilgili belirsizlik bilgisi içerdiğinde daha güçlüdür. Ayrıca, bu bulguya benzer şekilde, başlıca piyasalar ile igili belirsizlik göz önünde bulundurulduğunda, portföylerin (özellikle yüksek riskli olanların) kendine özgü riski ABD doları değerinin başlıca yabancı para birimleri karşısında yükselmesi ile önemli ölçüde artmaktadır.

Anahtar Kelimeler: Fonlama likiditesi, rezerv para birimi, kendine özgü risk, belirsizlik

To My Family

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CHAPTER 1

INTRODUCTION

There has been an increased interest and hot debate on how idiosyncratic risks are diversified away. The CAPM theory predicts that idiosyncratic risk is fully eliminated through diversification. However, several assumptions in this model, such as complete information and frictionless markets, do not reflect reality (Merton, 1987). Holding perfectly diversified portfolios is not possible due to several exogenous reasons (e.g. transaction costs and liquidity) related to idiosyncratic risk (Levy, 1978; Merton, 1987; Malkiel and Xu, 2001). Investors may not successfully diversify their portfolios since their volatility exposure is not only dependent on aggregate market volatility, but also on idiosyncratic volatility (Campbell et al., 2001). The impossibility of holding the market portfolio leads investors to require greater returns as compensation for imperfect diversification (Merton, 1987; Bali and Cakici, 2008).

The idiosyncratic risks and, thus diversification opportunities are affected by the varying investment strategies of investors depending on their risk profile (Levy, 1978). Among these investors, financial intermediaries are of primary importance due to their advantageous position of quickly trading various asset classes (He et al., 2017). Despite the serious theoretical arguments about the key role of financial intermediaries in asset markets (e.g. Brunnermeier and Pedersen, 2009; Maggiori, 2017), to the extent of our knowledge, there is no empirical study that links the changes in the risk-bearing capacity of financial intermediaries to idiosyncratic risk fluctuations. The changes in the funding liquidity conditions in interbank markets and the reserve currency value (US dollar) can be used as proxies for the changes in the risk-bearing capacity of financial intermediaries based on the theoretical insights of Brunnermeier and Pedersen (2009) and Maggiori (2017). Hence, by identifying specified economic transmission channels, the main purpose of this paper is to study the role of

funding liquidity conditions and the reserve currency (US dollar) in predicting idiosyncratic risk taking business cycle fluctuations into account.

Since idiosyncratic volatility is unobservable, the focal point of discussion in the literature has been on how it can be measured. For example, using exponential generalized autoregressive conditional heteroskedastic (EGARCH) model (Nelson, 1991), Fu (2009) emphasizes the importance of time-varying characteristics of the conditional idiosyncratic volatility in predicting expected returns. Following Fu (2009), to examine the main determinants of idiosyncratic risks, we first estimate the EGARCH model to obtain idiosyncratic portfolio-level risks. However, this estimation may suffer from look-ahead bias problem (Fink et al., 2012; Guo et al., 2014). The omission of a variable including forward-looking information for equity returns and volatility could reduce the predictive accuracy of conditional volatility models. To account for the look-ahead bias, we consider the uncertainties in major financial asset and commodity markets and test whether they carry forward-looking information on the conditional volatility of portfolio returns. More importantly, we also test whether this information influences the significance and magnitude of the effects of main determinants of idiosyncratic portfolio level risks, namely the changing business cycles and funding liquidity conditions in interbank loan markets.

In order to investigate the determinants of idiosyncratic risks, we make use of autoregressive regressive distributed lag (ARDL) approach. This approach enables us to investigate dynamic interactions regardless of the integration order of variables (I (0) or I (1)) and hence leads to unbiased parameter estimations. Also, equally importantly, the ARDL model reduces the endogeneity problem with the correction of residual correlation. Hence, the ARDL approach allows us to make more reliable statistical inferences.

This study is grounded on two mechanisms through which financial intermediaries provide market liquidity and determine various asset prices in global markets. First, we take into consideration the availability of funding constraints faced by financial intermediaries, who act as speculators in stock

markets, leading to lower market liquidity and therefore, inducing higher risk premium (see Brunnermeier and Pedersen, 2009). This role played by financial intermediaries is expected to be intensified during high uncertainty periods. Specifically, we investigate whether the idiosyncratic risk of more risky portfolios exhibits more sensitivity to the fluctuations in funding conditions in interbank loan markets compared to less risky portfolios. Further, we examine whether this sensitivity is more pronounced when the idiosyncratic risks include information on the uncertainty related to major financial and commodity markets.

Second, we consider the central role of financial intermediaries (home intermediaries) in a financially developed country (the US in our case) in the global financial environment (see Maggiori, 2017). In a financially developed country, investors tend to make risky investments due to the ability of the financial intermediaries to easily overcome financial constraints, especially during good times. However, following a negative shock to the global economy, larger losses are observed because of these high-risk positions. Thus, during the crisis periods, there is a wealth transfer from the US to foreign countries, whose financial intermediaries take precautionary measures in good times (e.g. safer U.S. dollar liabilities) to increase their resilience to negative global economic conditions. This mechanism leads to the appreciation of the reserve currency (US dollar) for hedging purposes. Hence, one could argue that a significant US dollar appreciation is an indicator of worsening funding conditions in interbank markets (and hence lower market liquidity) leading to the increased idiosyncratic risks in the stock markets in crisis periods with high uncertainty. To that respect, we examine whether the fluctuations in the US dollar value against major foreign currencies have a stronger influence on the idiosyncratic risk of high-risk portfolios than on low-risk portfolios when we account for the uncertainty in leading financial and commodity markets. These economic mechanisms based on relevant theories are discussed in detail in Chapter 2 where our testable hypotheses are developed.

In sum, this paper examines how the dynamics of the relationship between factors related to the risk-bearing capacity of financial intermediaries and idiosyncratic risk varies, controlling for business cycles. Our baseline findings suggest that the portfolios that have high idiosyncratic risks are more vulnerable to the deterioration of funding liquidity conditions. This vulnerability is more pronounced when uncertainty information about main financial and commodity markets is incorporated into the idiosyncratic risk measurements. Last but not least, an increase in the reserve currency (US dollar) value substantially intensifies the idiosyncratic risks of portfolios containing the uncertainty information. This effect is especially stronger for the high-risk portfolios. A series of robustness checks show that our findings are robust to alternative econometric specifications (e.g. the assumption of normal distribution or Student's t-distribution in the EGARCH estimations and using alternative information criteria for choosing the lag orders of variables in the ARDL model). Overall, our study provides important insights into the role of financial intermediaries in determining the underlying economic mechanisms between asset markets.

The remainder of the study proceeds as follows. In Chapter 2, our testable hypotheses are developed based on theoretical studies and empirical evidence. In Chapter 3, we provide data sources, idiosyncratic risk estimates, summary statistics and preliminary analyses. We then identify the empirical methodology. In Chapter 4, we present empirical results and finally discuss robustness checks. In Chapter 5, we conclude our study with main remarks and future research directions.

CHAPTER 2

HYPOTHESIS DEVELOPMENT

In this chapter, considering theoretical arguments and empirical facts in the relevant literature, our testable hypotheses are developed. We first explain the reasons why uncertainty about the major markets could include forward-looking information on the idiosyncratic risk. Then, we consider two transmission channels through which the changes in the risk-bearing capacity of financial intermediaries influence idiosyncratic risks in stock markets. The first mechanism refers to how the funding conditions and idiosyncratic risks are linked, and the second one to the impact of uncertainty in financial and commodity markets on this link. In both transmission channels, financial intermediaries play a key role.

2.1 Uncertainty and Idiosyncratic Risk

According to the Intertemporal Capital Asset Pricing Model (ICAPM hereafter) introduced by Merton (1973), the increased uncertainty about future market returns increases hedging demands and precautionary savings. By changing the expectations of future cash flows (and/or expected market returns), unfavorable shifts in future investment opportunities increase investors' exposure to a deterioration in the economic conditions, which eventually results in increased hedging demands. The ICAPM of Merton (1973) suggests that the hedging ability of risky assets against uncertainties regarding future investment (and/or consumption) opportunities determines their demand. When considering these implications, depending on the uncertainty in future market expectations, it is strongly expected that seeking to hedge against deteriorations in the investment opportunity set might include information on expected idiosyncratic volatility. In this regard, uncertainty-based explanations of the determinants of idiosyncratic risks deserve careful and detailed investigation.

Macroeconomic uncertainty and market volatility are closely interrelated variables (Bloom, 2009; Schwert, 1989). An intensified economic uncertainty is usually observed under worsening economic conditions (Bloom, 2014), which strongly push market participants to hedge their volatility exposure. In a theoretical framework, Xia (2001) points out that hedging demands arising from uncertainty have a big importance in determining asset allocation decisions in an optimal portfolio. In another theoretical investigation, Bekaert et al. (2009) demonstrate that the contribution of uncertainty to countercyclical risk considerably increases in a recessionary period. They also conclude that most of the variation in conditional volatility of returns can be attributed to variation in uncertainty. When these arguments are taken into consideration, one might expect that uncertainty associated with economic recessions would be a key hedging component of the idiosyncratic volatility by influencing optimal portfolio structures.

Various sources of macroeconomic uncertainty influence economies as a whole through aggregate output, production cost, investment and employment (Bernanke 1983; Bloom, 2009). Bernanke and Kuttner (2005), using futures data, demonstrate a strong reaction of equity returns to an unanticipated component of monetary policy actions. In a similar study, Rigobon and Sack (2004) consider the monetary policy news as the main determinant of the Eurodollar futures rates and find evidence on the effect of interest rate (monetary policy) surprises obtained from the Eurodollar futures on the equity markets. The financialization of commodity markets has attracted much more interest recently and makes leading commodities (i.e. oil and gold) become strong determinants of equity return and volatility. Information uncertainty in oil markets influences the overall economy (i.e. production growth, consumption, and investment) (Bakshi and Chen, 1996; Elder and Serletis, 2010). Due to hedging potential of gold against fluctuations in the stock market (Baur and Lucey, 2010; Baur and McDermott, 2010; Elder et al., 2012; Chan et al., 2011), uncertainty in gold markets implies inflationary pressures and thereby future monetary policy actions. Overall,

uncertainty in treasury bond, currency, oil and gold markets could be of high importance on the behavior of volatile stocks.

Bali and Zhou (2016) argue that investors tend to protect themselves from unfavorable fluctuations in main markets during highly volatile periods. A rise in the number of hedging activities in derivative markets is observed during periods of increased uncertainty due to unfavorable shifts in future investment opportunities. Furthermore, financial intermediaries play an active role in derivative markets as sophisticated investors by using their expertise and knowledge (He et al., 2017). Therefore, to better understand the complex behaviors of financial intermediaries in asset markets, we need to consider the dynamics of derivative markets. Among derivative markets, options markets are highly valuable to financial intermediaries who can successfully hedge unexpected price fluctuations. Thus, the fluctuations in options markets provide an important forward-looking information about the positions that financial intermediaries will take in asset markets. Hedging studies mostly focus their concentration on the three major risk classes: commodity, currency, and interest rate (Allayannis and Ofek, 2001; Allayannis and Weston, 2001; Bartram, 2008; Campello et al., 2011; Nelson et al., 2005; Faulkender, 2005; Borokhovich et al. 2004; Jin and Jorion, 2006; Tufano, 1996; Treanor et al., 2014). Based on these risk classes, we argue that volatility expectations in major financial (currency and interest rate) and commodity (oil and gold) markets, which reflects uncertainty in these markets, may contain information regarding macroeconomic uncertainty and hence idiosyncratic risks. Also, the equities' higher exposure to option-implied equity market volatility has a big importance in the equity markets (Ang et al., 2006). The Chicago Board Options Exchange (CBOE) Volatility Index (VIX) is widely used as a proxy for uncertainty in the existing literature (e.g. Bloom, 2014; Leduc and Liu, 2016). In the light of this information, we use the implied volatility of the stock, treasury bond, currency, oil and gold prices from options markets as proxies for uncertainty to better capture the impact of information uncertainty in main markets on idiosyncratic risks.

2.2 Funding Liquidity and Idiosyncratic Risk

Various studies document correlations between trading volume (a proxy for liquidity risk) and volatility (Karpoff, 1987; Schwert 1989; Lamoureux and Lastrapes, 1990) as some others relate market liquidity to asset prices (Amihud and Mendelson, 1986; Constantinides, 1986; Heaton and Lucas, 1996; Huang, 2003). Intuitively, one could argue that investors require risk premium induced by illiquid markets leading to lower prices in order to compensate for their inability (increased cost of trading) to trade quickly in these markets. The presence of illiquid stocks could strongly inflate idiosyncratic portfolio-level volatility, especially for equally-weighted portfolios (Bali et al., 2005).

The impact of funding liquidity on idiosyncratic risk has not received any attention in the literature and, to the extent of our knowledge, has not been formally tested. Financial intermediaries are active market players impacting many markets' volatility simultaneously. They use both their own capital and collateralized borrowing from other financiers to finance their trading activities (Brunnermeier and Pedersen, 2009). Hence, the debt constraint of financial intermediaries is of central importance for their trading activities and hence in influencing asset prices[1]. Brunnermeier and Pedersen (2009) establish a link between funding liquidity and an asset's market liquidity in their model. According to their model, if market liquidity is sourced from funding liquidity, idiosyncratic volatility could be a direct proxy for fluctuations in market liquidity. They argue that the existence of funding constraints for financial intermediaries, who act as speculators in stock markets, leads to lower market liquidity and consequently induce higher risk premium. This process shows that market liquidity (and hence risk premia) is mainly driven by the speculators' funding constraints. The speculators' margins are not only based on the fundamental-based volatility but also on the liquidity-based volatility in the presence of uninformed financiers. Uninformed financiers could consider price volatility

[1] Other relevant studies concerning debt constraint framework are Geanokoplos and Fostel (2008), Adrian and Shin (2013) and Moreira and Savov (2017).

induced by market illiquidity as fundamental volatility leading to higher margins (Brunnermeier and Pedersen, 2009).

A high level of uncertainty leads to limited market participation by investors (Cao et al., 2005). In return, low market participation induces an increase in risk premium due to reduced market liquidity, which creates a need for hedging by market players. Mele (2007) documents this risk premium induced by fluctuating uncertainty leading to higher return volatilities in bad times. Financial intermediaries' capital and market uncertainty are interdependent factors influencing the equity markets simultaneously (Brunnermeier and Pedersen, 2009). In the presence of uncertainty in major markets, tightening funding constraints of financial intermediaries, due to higher destabilizing margins, substantially decrease market liquidity (Brunnermeier and Pedersen, 2009). Hence, idiosyncratic risks driven by the worsening funding conditions, in an uncertain economic environment, increase more compared to tranquil periods. In light of these assertions, we argue that negative shocks to funding liquidity will be transmitted to the idiosyncratic volatility via reduced market liquidity. Furthermore, this transmission is stronger when there is increased information uncertainty in main markets due to a significant reduction in the risk-bearing capacity of financial intermediaries. These economic mechanisms influence high volatility assets stronger than low volatility ones because the difficulty of determining fundamental value of high volatility (illiquid) assets increases margin requirements caused by market illiquidity (Brunnermeier and Pedersen, 2009). Taking the above arguments into consideration, the following testable hypotheses are suggested;

Hypothesis 1a. The deterioration in funding conditions in interbank loan markets significantly increases the idiosyncratic risk of portfolios.

Hypothesis 1b. This increase is stronger for the high-risk portfolios.

Hypothesis 1c. The impact of this increase is amplified in the presence of uncertainty.

2.3 The Reserve Currency (US Dollar) and Idiosyncratic Risk

The US dollar plays a key role in international markets since it is the principal funding and reserve currency. The portfolio structures of global investors are affected by the relative strength of this principal funding currency (Adrian et al., 2015). The operations of financial intermediaries (both US and non-US intermediaries) depend on the amount of their dollar liabilities. When considering the limited risk-bearing capacity of financial intermediaries, the significant shifts in global economic conditions have a strong influence on their operations and thereby lead to fluctuations in the US dollar value.

Gabaix and Maggiori (2015), in a theoretical investigation on exchange rate determination, argue that the changes in the balance sheets of financiers alter capital flows between global asset markets driving exchange rates. In their model, rather than the trade balance, inflation and output, the risk-bearing capacity of financiers is the underlying mechanism determining exchange rate fluctuations depending on the demand and supply conditions in global asset markets. To this respect, it can be said that financial intermediaries exist at the center of economic activities that determine the exchange rate dynamics. Foreign currencies are more sensitive to a negative shock in global markets than the US dollar. Hence, a global financial crisis severely reduces the risk-bearing capacity of foreign financial intermediaries (Gabaix and Maggiori, 2015). US financial intermediaries do not tend to take short dollar positions in times of crisis and thereby do not provide dollar bonds to the rest of the world. Therefore, foreign financial intermediaries need to take precautionary measures (e.g. safer U.S. dollar liabilities) in good times against sudden negative changes in global economic conditions. Through this mechanism, exchange rate fluctuations resulting from shifts in the risk-bearing capacity of financial intermediaries influence asset prices.

Our second hypothesis is based on the theoretical assertions of Maggiori (2017). This study turns attention to the key importance of the US financial

intermediaries in determining the reserve currency (US dollar) value. The US financial intermediaries mostly tend to invest in risky assets denominated in foreign currencies during economic upturns rather than safer US dollar liabilities. This is due to their ability to overcome funding difficulties easier than foreign intermediaries in good times. However, the US consumes more along with an increased financial income coming from risky investments in global markets as compensation. This tendency also enhances the US trade deficit (Maggiori, 2017). This economic mechanism makes the US intermediaries more vulnerable to negative shocks in the global economy during times of crisis. On the other hand, foreign financial intermediaries are more concerned about their funding problems irrespective of good or bad times. The foreign countries generally receive speculative capital inflows and consequently have risky currencies. Hence, the balance sheet of foreign financial intermediaries is relatively comprised of more US dollar (safer) liabilities for precautionary measures against adverse shocks to the global economy. From this point of view, the asymmetric risk sharing between financial intermediaries intensifies global financial instability and leads to wealth transfer from the USA to foreign countries in crisis periods. This mechanism ultimately causes US dollar appreciations due to hedging motives, which show a deterioration of funding liquidity conditions in interbank markets and hence reducing market liquidity during highly volatile periods.

In bad times, the abnormal losses in risky investments impair financial intermediaries' capital (particularly US ones due to greater risks in their external portfolio structure) and consequently, the intermediaries avoid risky investments in asset markets to prevent higher losses. Thus, along with a big negative shock to the global economy, both US and foreign financial intermediaries begin to seek safer assets in interbank markets (interbank deposits), which are mostly funded by the US intermediaries, and try to close out their risky positions in stock markets. However, compared to foreign intermediaries, US intermediaries taking more risks in good times are not motivated to provide dollar funds to foreign

intermediaries during high volatility periods due to their high-risk positions in global markets (Maggiori, 2017). When considering these changes in the risk-bearing capacity of financial intermediaries in bad times, a reduction in the risk appetite of US financial intermediaries distorts funding liquidity channels in interbank loan markets in the presence of high information uncertainty and thereby leads to enhanced financial frictions in global markets, such as lower trading volume in stock markets. Therefore, the extra dollar of their own capital is perceived as more valuable to the financial intermediaries during economic downturns than in tranquil periods (He et al., 2017).

Based on these transmission channels, a significant US dollar appreciation indicates a deterioration of funding liquidity conditions in interbank markets during crisis times. Hence, this significant appreciation reduces market liquidity and enhances risk premia in an uncertain economic environment. This transmission channel is also more observed for the high-risk portfolios, primarily due to the tendency to close out more risky positions. The below hypotheses follow these assertions.

Hypothesis 2a. An increase in the reserve currency (US dollar) value significantly increases the idiosyncratic risk including uncertainty information.

Hypothesis 2b. This increase intensifies for the high-risk portfolios.

CHAPTER 3

DATA, EMPIRICAL FRAMEWORK, AND PRELIMINARY ANALYSIS

3.1 Measurement of Idiosyncratic Risks and Data Sources

Idiosyncratic volatility is a common measure of idiosyncratic risk. Previous finance literature reveals the time-varying nature of idiosyncratic volatility. Thus, we focus our attention on examining time-varying conditional volatility in this study. Following Fu (2009), to take into consideration the asymmetric impact of positive and negative news and the time-varying behavior of idiosyncratic volatilities, we use an EGARCH (1,1) model, which is one of the simplest and robust specifications among volatility models (Engle and Ng, 1993), to derive expected idiosyncratic volatilities.

We employ standard sets of 4 portfolios sorted by market capitalizations (ME) and book to market ratios (BE/ME). Namely, daily portfolio-level return data is used to estimate the idiosyncratic risks of size and value portfolios, which are small-growth, small-value, large-growth, and large-value portfolios. Using daily data is less sensitive to look-ahead bias due to a large number of observations (Guo et al. 2014).

To avoid the errors-in-variables problem, portfolio-level idiosyncratic volatility is estimated rather than individual idiosyncratic volatility considering the implications of Fama and French (1992). This procedure reduces the noise problem stemming from the use of daily data. We not only use value-weighted but also equally-weighted portfolio returns. The equally-weighted portfolios, which consist of relatively smaller and illiquid stocks, could be more affected by bid-ask bounce problem inflating volatility (Bali et al., 2005). We adopt the

Carhart (1997) four-factor model to provide a better adjustment for risk in the mean equation of EGARCH specification[2].

Carhart four-factor model (1997) is employed to consider market, size, value and momentum factors. The estimated mean equation is as below;

$$R_{it} - r_{ft} = \varphi_{it} + b_{it}\,(R_{mt} - r_f) + s_{it}\,smb_t + h_{it}\,hml_t + m_{it}\,mom_t + \varepsilon_t \quad (3.1)$$

We regress daily excess returns of size-value portfolios on four factors (the three Fama-French factors and momentum). R_m-r_f, *smb* (small minus big), *hml* (high minus low), and *mom* (winner minus loser) refer to the market (the daily excess return of market portfolio), size (the difference between the return on small stocks portfolio and the return on large stocks portfolio), value (the difference between the return on high book-to-market stocks portfolio and the return on low book-to-market stocks portfolio), and momentum (the difference between the return on high-momentum (winner) stocks portfolio and the return on low-momentum (losers) stocks portfolio) factors, respectively. The r_f represents the risk-free rate. We assume the normal distribution of residuals (errors) as in Fu (2009). The four factors data (market, size, value, and momentum), risk-free rate and portfolio return data are sourced from Kenneth French's online data library for the idiosyncratic risk estimations [3].

The estimated variance equation is represented as follows;

$$\ln(h_t) = \beta_0 + X\left|\frac{\varepsilon_{t-1}}{\sqrt{h_{t-1}}}\right| + \gamma\frac{\varepsilon_{t-1}}{\sqrt{h_{t-1}}} + \beta_h \ln(h_{t-1}) \quad (3.2)$$

β_h and X refer to GARCH and ARCH parameters, respectively, as γ refers to asymmetry parameter. The square root of the derived conditional variance is employed as a proxy for idiosyncratic risk, as commonly used in the relevant literature.

[2] Similar studies (e.g. Fu, 2009; Guo et al. (2014) use the Fama–French three factors in the mean equation. We also take into account the momentum factor introduced by Carhart (1997) along with the Fama–French three factors (Fama and French,1993) for the mean equation specifications.

[3] We thank Kenneth French for kindly providing these data.

Incorporating forward-looking information, which is not available at time t, into the idiosyncratic volatility estimates may introduce look-ahead bias inducing spurious risk-return relationships (Fink et al., 2012; Guo et al., 2014). Unexpected changes in expected idiosyncratic volatility could play a central role in the risk-return relationship (Guo et al., 2014). The omission of a variable including forward-looking information for equity returns and volatility could reduce the predictive accuracy of conditional volatility models. In addition to the arguments discussed in subsection 2.1., several cornerstone studies document information content of the implied volatility index for future returns (Banerjee et al. 2007), future and past volatilities (Christensen and Prabhala, 1998) and conditional variance of equity returns (Day and Lewis, 1992; Guo and Whitelow, 2006). Based on the findings of these studies, implied volatility indices containing forward-looking information from options markets are important elements in the information set available to market players at time t. Thus, we consider a forward-looking measure of stock, treasury bonds, currency, oil and gold markets' volatility using options as exogenous variables in the variance equation to obtain uncertainty driven conditional volatility estimation. Our base argument is that the use of forward-looking information from options markets in the variance equation could reduce look-ahead bias and improve prediction accuracy. It is also expected to capture the unknown variations of equity return volatility. More importantly, as discussed in the introduction part and subsection 2.1., we take into account uncertainty information using implied volatilities in leading financial and commodity markets in the specified variance equation to test our hypotheses.

We use CBOE Volatility Index (VIX, measuring 30-day volatility expectations in S&P 500 index), CBOE 10-year U.S. Treasury Note Volatility Index (TYVIX, measuring a constant 30-day expected volatility of 10-year Treasury Note futures prices)[4], CBOE Euro Currency Volatility Index (EVZ, measuring 30-day volatility expectations in $US/Euro exchange rate "currency

[4] The TYVIX is used to effectively capture the changes in monetary policy uncertainty (CBOE, 2015)

share euro trust options"), CBOE Gold Volatility Index (GVZ, measuring 30-day volatility expectations in SPDR Gold Shares options), and CBOE Crude Oil Volatility Index (OVX, measuring 30-day volatility expectations in United States Oil Fund option prices) sourced from Chicago Board Options Exchange[5]. We employ the daily innovations in implied volatilities as proxies for changes in uncertainty in major markets due to the non-stationary characteristics of the volatility behavior of options markets (Ang et al., 2006). Using the daily innovations also enables us to better capture a negative shock to global markets.

The specified variance equation is indicated as below;

$$\ln(h_t) = \beta_0 + X\left|\frac{\varepsilon_{t-1}}{\sqrt{h_{t-1}}}\right| + + \gamma\frac{\varepsilon_{t-1}}{\sqrt{h_{t-1}}} + \beta_h \ln(h_{t-1}) + dlvix + dltyvix + dlevz + dlovx + dlgvz \quad (3.3)$$

The *dlvix, dltyvix, dlevz, dlovx,* and *dlgvz* are the first differences of logarithmic implied volatilities representing the daily changes in the implied volatilities in the stock, bond, currency, oil and gold markets, respectively. The sample period ranges from June 3, 2008 to October 31, 2017. We determine the analysis period based on the availability of GVZ data. The GVZ has no data prior to June 3, 2008, so the GVZ data availability restricts our sample period. The selected time period also allows us to examine economic mechanisms in the U.S. during the crisis and post-crisis periods.

3.2 Idiosyncratic Risk Estimates

In this section, we first estimate portfolio-level idiosyncratic risks and then investigate if the incorporation of uncertainty information in major financial and commodity markets into idiosyncratic risk estimations improves the conditional variance estimates. As mentioned in the preceding sections, uncertainty information in major markets could reduce potential look-ahead bias in estimating conditional volatilities. Additionally, and more importantly, this

[5] See more details in http://www.cboe.com.

empirical procedure allows us to test our hypotheses based on sound economic theories.

The descriptive statistics of derived idiosyncratic risk are presented in table 3.1. IRSGEP, IRSGVP, IRSVEP, IRSVVP, IRLGEP, IRLGVP, IRLVEP, IRLVVP represent the idiosyncratic risks of small-growth equally-weighted, small-growth value-weighted, small-value equally-weighted, small-value value-weighted, large-growth equally-weighted, large-growth value-weighted, large-value equally-weighted, large-value value-weighted portfolios, respectively. The initial letter "S" refers to the specialized idiosyncratic risk including uncertainty information in major financial and commodity markets (e.g. SIRSGEP is the specialized idiosyncratic risk of small-growth equally-weighted portfolio including uncertainty information in major financial and commodity markets).

As expected, the equally-weighted portfolios are riskier than the value-weighted portfolios due to market microstructure problems, such as lower trading ability and hence bid-ask bounce problem. This is because of the larger weights of smaller firms' stocks compared to the value-weighted portfolios. The risk of a portfolio increases along with an increase in the weight of small companies in the portfolio due to imperfect information, higher business risk and greater cost of capital, which make the equally-weighted portfolios' volatility more cyclically sensitive. Furthermore, as expected, the riskiest portfolio is the small-growth equally-weighted portfolio. The main reason behind this result is that although small-growth firms have higher growth opportunities than their value peers and large firms, they are exposed to more volatile business environments due to some disadvantages, such as lack of know-how, funding deficiency, poor brand-recognition and uncertain long-run prospects. It appears that the large-value portfolios are riskier than large-growth portfolios. Large-value firms' earnings are strongly dependent on business cycles, which makes them more prone to cash flow risks. Thus, large-value companies are more vulnerable to exogenous shocks during economic recessions than large-growth companies.

Table 3.1 - Descriptive statistics of derived idiosyncratic risks

Panel A. The idiosyncratic risks of small-cap portfolios

	IRSGEP	SIRSGEP	IRSGVP	SIRSGVP	IRSVEP	SIRSVEP	IRSVVP	SIRSVVP
Mean	0.3462	0.3439	0.2312	0.2305	0.2898	0.289	0.0989	0.0985
Median	0.2998	0.2912	0.1981	0.1973	0.2364	0.2275	0.0863	0.086
Maximum	1.1499	1.2913	0.8082	0.9185	1.0803	1.0884	0.2423	0.2643
Minimum	0.1842	0.1757	0.1095	0.1022	0.1108	0.129	0.0538	0.0541
Std. Dev.	0.1475	0.1629	0.1046	0.108	0.1619	0.1666	0.0346	0.0357
Skewness	2.2331	2.5953	2.3216	2.6076	2.2528	2.3155	1.4484	1.6663
Kurtosis	8.6099	11.04	9.1162	11.494	8.4106	8.6301	4.4653	5.7888
Jarque-Bera	4927.6	8776.9	5651	9520.3	4750.9	5093.1	1010	1809.7
Probability	0	0	0	0	0	0	0	0
Sum	796.17	790.97	531.84	530.13	666.64	664.74	227.37	226.6
Sum Sq. Dev.	50.015	61.036	25.162	26.797	60.25	63.787	2.7574	2.9227
Observations	2300	2300	2300	2300	2300	2300	2300	2300

Panel B. The idiosyncratic risks of large-cap portfolios

	IRLGEP	SIRLGEP	IRLGVP	SIRLGVP	IRLVEP	SIRLVEP	IRLVVP	SIRLVVP
Mean	0.1931	0.1913	0.1006	0.1002	0.2649	0.2625	0.2487	0.2477
Median	0.1681	0.1642	0.0917	0.0904	0.221	0.2172	0.2088	0.2066
Maximum	0.6724	0.8078	0.2365	0.2707	0.9608	1.0518	0.9744	1.1128
Minimum	0.1027	0.1113	0.0669	0.0691	0.1167	0.1035	0.1221	0.1147
Std. Dev.	0.0814	0.0914	0.0285	0.0302	0.1371	0.1398	0.1184	0.1246
Skewness	2.765	3.1795	2.2177	2.6901	2.3567	2.4629	2.5378	2.776
Kurtosis	12.053	15.03	8.0528	11.325	9.1618	9.8602	10.749	12.877
Jarque-Bera	10785	17745	4332.1	9416.5	5767.6	6835.4	8223.8	12303
Probability	0	0	0	0	0	0	0	0
Sum	444.04	440.07	231.47	230.45	609.28	603.7	571.92	569.67
Sum Sq. Dev.	15.236	19.212	1.8683	2.0993	43.224	44.928	32.24	35.688
Observations	2300	2300	2300	2300	2300	2300	2300	2300

Notes: Table 3.1 presents descriptive statistics of idiosyncratic risks. Panel A provides descriptive statistics of obtained idiosyncratic risk estimates of small-cap portfolios. Panel B presents descriptive statistics of obtained idiosyncratic risk estimates of large-cap portfolios. IRSGEP, IRSGVP, IRSVEP, IRSVVP, IRLGEP, IRLGVP, IRLVEP, IRLVVP represent the idiosyncratic risks of small-growth equally-weighted, small-growth value-weighted, small-value equally-weighted, small-value value-weighted, large-growth equally-weighted, large-growth value-weighted, large-value equally-weighted, large-value value-weighted portfolios, respectively. The initial letter "S" refers to the specialized idiosyncratic risk including uncertainty information in major financial and commodity markets (e.g. SIRSGEP is the idiosyncratic risk of small-growth equally-weighted portfolio including uncertainty information in major financial and commodity markets).

The EGARCH variance equation estimation results are reported for the idiosyncratic risk of small-growth, small-value, large-growth, large-value portfolios in Table 3.2, 3.3, 3.4, and 3.5, respectively. Our main findings suggest the significant effects of implied volatilities in the stock, bond, currency, oil, and gold markets on the conditional variances. The estimated EGARCH models, with the implied volatilities in the variance equation, have higher log-likelihood values and lower Akaike information criteria (AIC) than the EGARCH model without them. These results suggest that the uncertainty in major markets enhances the predictive accuracy of conditional variance estimates and thereby reduces look-ahead bias.

The statistically significant GARCH and ARCH parameters (β_h and X) indicate the existence of conditional heteroscedasticity. Compared to ARCH parameters, larger GARCH parameters indicate the more significant impact of long run volatility. Not surprisingly, the sign of the asymmetry parameter (γ) is negative indicating significant leverage effects in risky portfolio return series. To put it in different words, negative shocks affect highly risky portfolio volatilities more than positive shocks compared to less risky portfolio volatilities due to low information quality. Guo et al. (2014) imply that unexpected changes in expected idiosyncratic volatility could lead to look-ahead bias. Our findings clearly demonstrate that the inclusion of implied volatilities into the variance equation reduces the impact of ARCH and asymmetry parameters, which shows the impact of unexpected shocks on the conditional variances. The inclusion of uncertainty information in main markets available at time t into idiosyncratic risk estimates, and thus a reduction in the magnitude of ARCH and asymmetry coefficients, seems to reduce the look-ahead bias problem.

Table 3.2 - Variance equation parameter estimates for small-growth stocks

	Portfolio Excess Returns							
	SGEP-Rf				SGVP-Rf			
	No specification		With specification		No specification		With specification	
	Coeff.	Std. Err.	Coeff.	Std. Err.	Coeff.	Std. Err.	Coeff.	Std. Err.
β_0	-0.1224***	0.014	-0.055***	0.009	-0.152***	0.016	-0.1214***	0.015
χ	0.1402***	0.0137	0.0675***	0.0105	0.1553***	0.0132	0.1269***	0.014
Υ	-0.0083	0.0071	-0.0009	0.0058	-0.03***	0.0086	-0.0261***	0.0081
β_h	0.9938***	0.0025	0.9988***	0.0011	0.9897***	0.003	0.9926***	0.0025
dlvix			1.6204***	0.2103			0.4802*	0.2687
dltyvix			-0.341	0.2724			0.0672	0.2927
dlevz			0.3286	0.2572			-0.0641	0.328
dlovx			-0.103	0.2643			0.6201**	0.2907
dlgvz			-0.09	0.2355			0.3136	0.2808
Estimation output								
Loglikelihood	-697.72		-658.7		277.96		290.76	
AIC	0.5959		0.5674		-0.227		-0.2335	

Notes: Table 3.2 presents the estimation of coefficients in the variance equations for the relevant return series. SGEP-Rf and SGVP-Rf refer to the excess returns of small-growth equally-weighted and small-growth value-weighted portfolios, respectively. χ, Υ, and β_h represent ARCH, leverage, and GARCH parameters, respectively. The dlvix, dltyvix, dlevz, dlovx, and dlgvz are the first differences of logarithmic implied volatilities representing the daily changes in the implied volatilities in the stock, bond, currency, oil and gold markets, respectively. Log-likelihood and AIC refer to the log-likelihood and Akaike information criteria (AIC) values for the univariate EGARCH (1,1) models. *** Significant at the 1 percent level; ** significant at the 5 percent level; * significant at the 10 percent level.

Table 3.3 - Variance equation parameter estimates for small-value stocks

	Portfolio Excess Returns							
	SVEP-Rf				SVVP-Rf			
	No specification		With specification		No specification		With specification	
	Coeff.	Std. Err.	Coeff.	Std. Err.	Coeff.	Std. Err.	Coeff.	Std. Err.
β_0	-0.1235***	0.0119	-0.081***	0.0098	-0.152***	0.0232	-0.112***	0.0192
χ	0.1488***	0.0134	0.1005***	0.0117	0.1328***	0.0164	0.0997***	0.0149
Υ	-0.028***	0.0052	-0.016***	0.0048	0.0191**	0.0087	0.0111	0.009
β_h	0.9963***	0.0017	0.9984***	0.0012	0.9899***	0.0032	0.9929***	0.0025
dlvix			0.6803***	0.1776			0.1222	0.2363
dltyvix			-0.211	0.2438			0.2999	0.3244
dlevz			0.7562***	0.239			0.1966	0.3144
dlovx			0.0803	0.2515			0.1185	0.2843
dlgvz			0.1234	0.2299			0.7833***	0.2686
Estimation output								
Loglikelihood	-173.57		-157.1		2244.3		2255.5	
AIC	0.1539		0.1443		-1.885		-1.891	

Notes: Table 3.3 presents the estimation of coefficients in the variance equations for the relevant return series. SVEP-Rf and SVVP-Rf refer to the excess returns of small-value equally-weighted and small-value value-weighted portfolios, respectively. χ, Υ, and β_h represent ARCH, leverage, and GARCH parameters, respectively. The dlvix, dltyvix, dlevz, dlovx, and dlgvz are the first differences of logarithmic implied volatilities representing the daily changes in the implied volatilities in the stock, bond, currency, oil and gold markets, respectively. Log-likelihood and AIC refer to the log-likelihood and Akaike information criteria (AIC) values for the univariate EGARCH (1,1) models. *** Significant at the 1 percent level; ** significant at the 5 percent level; * significant at the 10 percent level.

Table 3.4 - Variance equation parameter estimates for large-growth stocks

	Portfolio Excess Returns							
	LGEP-Rf				LGVP-Rf			
	No specification		With specification		No specification		With specification	
	Coeff.	Std. Err.	Coeff.	Std. Err.	Coeff.	Std. Err.	Coeff.	Std. Err.
β_0	-0.142***	0.0159	-0.042***	0.0076	-0.094***	0.0161	-0.047***	0.0102
χ	0.1335***	0.0123	0.044***	0.0076	0.0744***	0.0111	0.0338***	0.0085
Υ	-0.039***	0.0092	-0.016***	0.0061	0.0249***	0.0077	0.0117**	0.0058
β_h	0.9884***	0.0028	0.9976***	0.001	0.9923***	0.0024	0.9956***	0.0013
dlvix			1.2871***	0.2123			0.4259**	0.2085
dltyvix			0.2313	0.2278			0.1392	0.2579
dlevz			-0.052	0.2383			-0.065	0.2376
dlovx			-0.012	0.2387			0.0511	0.2168
dlgvz			0.5441**	0.2477			0.4944**	0.216
Estimation output								
Loglikelihood	675.09		713.57		2149.3		2159.8	
AIC	-0.562		-0.59		-1.805		-1.81	

Notes: Table 3.4 presents the estimation of coefficients in the variance equations for the relevant return series. LGEP-Rf and LGVP-Rf refer to the excess returns of large-growth equally-weighted and large-growth value-weighted portfolios, respectively. χ, Υ, and β_h represent ARCH, leverage, and GARCH parameters, respectively. The dlvix, dltyvix, dlevz, dlovx, and dlgvz are the first differences of logarithmic implied volatilities representing the daily changes in the implied volatilities in the stock, bond, currency, oil and gold markets, respectively. Log-likelihood and AIC refer to the log-likelihood and Akaike information criteria (AIC) values for the univariate EGARCH (1,1) models. *** Significant at the 1 percent level; ** significant at the 5 percent level; * significant at the 10 percent level.

Table 3.5 - Variance equation parameter estimates for large-value stocks

	Portfolio Excess Returns							
	LVEP-Rf				LVVP-Rf			
	No specification		With specification		No specification		With specification	
	Coeff.	Std. Err.	Coeff.	Std. Err.	Coeff.	Std. Err.	Coeff.	Std. Err.
β_0	-0.1***	0.0111	-0.036***	0.0071	-0.1854***	0.0173	-0.1521***	0.0157
χ	0.1111***	0.0116	0.0432***	0.0081	0.1835***	0.0127	0.1548***	0.0131
Υ	-0.043***	0.0077	-0.027***	0.005	-0.0271***	0.0091	-0.0237***	0.0086
β_h	0.9949***	0.0016	0.999***	0.0007	0.9854***	0.0035	0.9892***	0.0029
dlvix			0.2104	0.1969			0.1866	0.2884
dltyvix			0.7571***	0.2234			0.3293	0.2866
dlevz			-0.288	0.2395			-0.0759	0.3112
dlovx			0.2916	0.2208			0.7762**	0.3153
dlgvz			1.1698***	0.2306			0.918***	0.2874
Estimation output								
Loglikelihood	0.725		29.41		117.28		138.66	
AIC	0.007		-0.013		-0.0913		-0.1052	

Notes: Table 3.5 presents the estimation of coefficients in the variance equations for the relevant return series. LVEP-Rf and LVVP-Rf refer to the excess returns of large-value equally-weighted and large-value value-weighted portfolios, respectively. χ, Υ, and β_h represent ARCH, leverage, and GARCH parameters, respectively. The dlvix, dltyvix, dlevz, dlovx, and dlgvz are the first differences of logarithmic implied volatilities representing the daily changes in the implied volatilities in the stock, bond, currency, oil and gold markets, respectively. Log-likelihood and AIC refer to the log-likelihood and Akaike information criteria (AIC) values for the univariate EGARCH (1,1) models. *** Significant at the 1 percent level; ** significant at the 5 percent level; * significant at the 10 percent level.

As for the role of the implied volatilities in the variance equation, some of our findings are worth mentioning. Our results suggest that information uncertainty in main financial and commodity markets is an important source of idiosyncratic volatility. The estimation results appear to be dependent on the underlying fundamentals of portfolios. The information content of VIX (stock market uncertainty) on the idiosyncratic risks of small- and large- growth equally-weighted portfolios is stronger than their value counterparts. This could be due to some underlying characteristics of growth firms. As opposed to paying dividend, turning retained earnings into potentially profitable investments, which is a widely common tendency among growth firms, leads to significant increases in growth stock prices. Hence, profits are gained through stock price appreciations (capital gains) rather than through dividends. The tendency to pay lower dividends (less reliable income) leads investors to hedge the price risks of growth stocks arising from future stock market uncertainty (VIX) in a volatile financial environment. This tendency may result in increased growth stock volatilities.

In addition, we observe that uncertainty information in gold and bond markets, which is related to monetary policy uncertainty and inflationary pressures, has more noticeable information content on the idiosyncratic risks of large-value portfolios compared to other portfolios. Large-value stocks are significantly influenced by cash flow risk due to high dividend expectations based on their healthy and vigorous fundamentals. The risk of value strategies increases during recessionary periods due to greater cash flow risks (Campbell and Vuolteenaho, 2004; Campbell et al., 2009). For example, macroeconomic news, such as monetary policy uncertainty, may lead to increased cash flow risk in an inflationary environment through the negative impacts on value firms' underlying risks. Therefore, during hard times, increasing value stock volatilities are observed due to the overreactions of investors to a series of macroeconomic news.

3.3 Macroeconomic Risk Variables

Idiosyncratic volatility is strongly influenced by economic recessions and business cycles. (Hamilton and Lin, 1996; Campbell et al., 2001, Goyal and Santa-Clara, 2003). Business cycle variables could influence idiosyncratic risk through discount rate and cash flow variability (Bekaert et al. 2012). Macroeconomic risk factors, i.e. default spread, term spread, and federal funds rate are influential on asset returns and volatilities. While default spread (DEF hereafter) reflects changes in long-term business conditions, the term spread (TERM hereafter) has been shown to be a better proxy for explaining short-term business cycles (Fama and French, 1989). During periods of weak economic conditions, default spread and term spread are expected to be high. Federal funds rate (FF hereafter) is considered to examine the impact of interest rates on the U.S. economy since it is widely accepted as the most influential interest rate affecting financial and monetary conditions (Spindt and Hoffmeister, 1988; Hamilton and Jorda, 2002). In this study, we also use U.S. business condition index (BCI hereafter) recommended by Arouba et al. (2009), as this index is seen as one of the top 50 economic indicators reflecting macroeconomic conditions (Constable and Wright, 2011). In sum, we consider the DEF, TERM, FF, and BCI to control for business cycle fluctuations. Daily data on the 10-year Treasury bond yields, 3-month Treasury bill, AAA-rated and BAA-rated corporate bond yields and federal funds rate are sourced from the H.15 database of the Federal Reserve Board and the Federal Reserve Bank of St. Louis. The term spread refers to the difference between the yields on the 10-year Treasury bond and the 3-month Treasury bill. The default spread represents the difference between the yields on the BAA-rated and AAA-rated corporate bonds. Business condition index is obtained from the Federal Reserve Bank of Philadelphia.

We use the TED spread and trade-weighted U.S. dollar index to consider funding liquidity conditions in interbank loan markets and changes in the reserve currency value, respectively. The TED spread (the difference between 3-Month

LIBOR based on US dollars and 3-Month Treasury Bill) is commonly used as a measure to take into funding illiquidity consideration. The trade-weighted U.S. dollar index is a weighted average of the exchange value of the U.S. dollar against major foreign currencies of U.S. trading partners. This broad index includes the Argentina, Australia, Brazil, Canada, Chile, China, Colombia, Euro Area, Hong Kong, India, Indonesia, Israel, Japan, Korea, Malaysia, Mexico, Philippines, Russia, Saudi Arabia, Singapore, Sweden, Switzerland, Taiwan, Thailand, United Kingdom, and Venezuela. Hence, it enables us to better understand the global fluctuations in U.S. dollar value. The TED spread and trade-weighted U.S. dollar index data are collected from the Federal Reserve Bank of St. Louis. The higher values of the TED spread and trade-weighted U.S. dollar index show more funding illiquidity (a deterioration of funding liquidity conditions in interbank markets) and a stronger U.S. dollar in global markets, respectively.

3.4 Unit Root Test Results

To provide a consistent measurement interval across variables, we exclude days when any of the variables has a missing value. Before investigating the long-run determinants of idiosyncratic risks, we test the order of integration of variables employing Augmented Dickey-Fuller (ADF) tests. Unit root test findings are summarized in Table 6. The findings suggest that some variables are integrated of order 0 (I(0)) whereas some others are integrated of order 1 (I(1)). We can make use of the ARDL approach in the presence of variables which are either I(0) or I(1) to obtain unbiased parameter estimates. According to the mixed test results, there is no objection to using the ARDL model. Last but not least, the test results show that idiosyncratic volatilities display time-varying properties.

Table 3.6 - Unit root test results for idiosyncratic volatility series and macroeconomic factors

		ADF Statistics (Level)	ADF Statistics (First Differences)			ADF Statistics (Level)	ADF Statistics (First Differences)
IRSGEP	Intercept	-2.572746	-10.29458***	IRSGEP	Intercept	-2.687479	-10.29275***
SIRSGEP		-3.025817	-10.03351***	SIRSGEP	and Trend	-3.171468	-10.03150***
IRSGVP		-2.60145	-12.87751***	IRSGVP		-2.823026	-12.87832***
SIRSGVP		-2.725472	-12.16466***	SIRSGVP		-2.946723	-12.16545***
IRSVEP		-2.306795	-12.07032***	IRSVEP		-2.597323	-12.06700***
SIRSVEP		-2.419452	-10.71267***	SIRSVEP		-2.778187	-10.71025***
IRSVVP		-2.463402	-12.15721***	IRSVVP		-3.477253	-12.15424***
SIRSVVP		-2.797874	-11.05145***	SIRSVVP		-3.776425	-11.04807***
IRLGEP		-2.871387	-9.998467***	IRLGEP		-3.25934	-9.991864***
SIRLGEP		-3.521974***	-8.784182***	SIRLGEP		-4.036880***	-8.779314***
IRLGVP		-2.647777	-10.03195***	IRLGVP		-2.943011	-10.03018***
SIRLGVP		-2.57765	-8.521710***	SIRLGVP		-2.791192	-8.529386***
IRLVEP		-3.345304	-9.952422***	IRLVEP		-3.449062	-9.950664***
SIRLVEP		-3.034392	-9.105225***	SIRLVEP		-3.169207	-9.104667***
IRLVVP		-2.589915	-13.97688***	IRLVVP		-3.055111	-13.97643***
SIRLVVP		-2.764989	-12.99870***	SIRLVVP		-3.219018	-12.99773***
DEF		-2.620885	-6.592071***	DEF		-3.218261	-6.590045***
TERM		-1.796483	-10.44105***	TERM		-3.307862	-10.47077***
FF		-4.124450***	-7.841354***	FF		-4.540521***	-8.282854***
TED		-2.653197	-13.01366***	TED		-2.724624	-13.02283***
△BCI		-14.93114***	-17.62955***	△BCI		-14.93203***	-17.62564***
△USD		-47.03638***	-21.24177***	△USD		-47.02656***	-21.23711***

Notes: Superscripts *, **, *** represent the significance at 10%, 5%, and 1% levels, respectively.

3.5 Autoregressive Distributed Lag Model (ARDL)

To uncover the long-run determinants of idiosyncratic volatilities, we utilize an autoregressive distributed lag (ARDL) model of Pesaran and Shin (1998) and Pesaran et al. (2001). In this model, using the ordinary least squares method (OLS), we can obtain unbiased and consistent short- and long-run parameter estimates in the presence of cointegrating relationship irrespective of the integration order of variables (I(0) or I(1)). By selecting appropriate lag orders for the regressors, Pesaran and Shin (1999) document that the ARDL model simultaneously reduces the residual correlation and the endogeneity problem. Overall, using standard normal asymptotic theory, this model helps us avoid spurious regression results and thereby obtain more reliable findings on the long-run parameters. The first part of the procedure involves an estimation of the below error-correction model.

$$\Delta DEP_t = \phi_0 + \alpha_0 DEP_{t-1} + \sum_{j=1}^{k} \alpha_j INDEP_{j,t-1} + \sum_{i=1}^{p} \theta_{0i} \Delta DEP_{t-i} + \sum_{i=0}^{q} \sum_{j=1}^{k} \theta_{ji} \Delta INDEP_{j,t-i} + \varepsilon_t \quad (3.4)$$

The *p* and *q* represent the lagged levels of variables and *k* is the number of independent variables[6]. The lag orders of p and q are chosen using the Schwarz Bayesian criterion suggested by Pesaran and Shin (1999). The α_s and θ_s refer to the long-run and short-run parameters, respectively. Where DEP_t is the portfolio level idiosyncratic risks and $INDEP_t$ is a vector of the macroeconomic determinants of DEP_t. The Δ denotes the first differences of the variables. We follow bounds testing procedure suggested by Pesaran et al. (2001) and use an F-statistics to conduct a joint significance test (H_0: $\alpha_0 = \alpha_1 = \ldots\ldots = \alpha_k = 0$). To test long-run cointegration relationship, the two asymptotic critical values are used for lower and upper bounds assuming that the independent variables are either I(0) or I(1), respectively. If the F-statistic is below the lower bound the null hypothesis

[6] The maximum number of lags for the dependent and independent variables is determined to be 8.

of no cointegration cannot be rejected. On the other hand, the F-statistic is above the upper bound no cointegration null can be rejected. The F-statistic falling between the upper and lower bounds leads to an inconclusive result.

In the second step, based on the suggested optimal lag lengths, the long-run coefficients are estimated. In this way, the ARDL model allows us to investigate the long-run impacts of macroeconomic variables on the idiosyncratic risks in the presence of cointegration relationship. The following model is estimated to obtain long-run coefficients.

$$DEP_t = \lambda C_t + \sum_{i=1}^{p} \tau_i DEP_{t-i} + \sum_{i=0}^{q} \beta_i INDEP_{t-i} + \varepsilon_t \tag{3.5}$$

where *DEP* is a t * 1 vector of the dependent variable, *INDEP* is a t * k vector of determinants, and C refers to a t * n vector of deterministic variables such as an intercept, and dummy variables with fixed lags. In vector notation, Equation (3.5) is shown as below;

$$\tau(L)DEP_t = \lambda C_t + \beta(L)INDEP_t + \varepsilon_t \tag{3.6}$$

where $\tau(L)$ is the polynomial lag operator $1 - \tau_1 L - \tau_2 L^2 - \ldots - \tau_p L^p$; $\beta(L)$ is the polynomial lag operator $\beta_1 + \beta_1 L + \beta_2 L^2 + \ldots + \beta_q L^q$; L refers to the usual lag operator ($L^r x_t = x_{t-r}$). To obtain long-run parameter estimates, we first estimate the ARDL model by OLS and then solve the estimated version of Equation (3.5) for the cointegrating relationships $DEP_t = \delta C_t + \psi INDEP_t + \nu_t$ via:

$$\hat{\psi} = \frac{\hat{\beta}_0 + \hat{\beta}_1 + \ldots + \hat{\beta}_q}{1 - \hat{\tau}_1 - \hat{\tau}_2 - \ldots - \hat{\tau}_p} \tag{3.7}$$

$$\hat{\delta} = \frac{\hat{\lambda}}{1 - \hat{\tau}_1 - \hat{\tau}_2 - \ldots - \hat{\tau}_p} \tag{3.8}$$

$\hat{\psi}$ shows the long-run impact of independent variables on the dependent variable and, similarly, $\hat{\delta}$ shows the long-run impact of deterministic exogenous variables (e.g. intercept and dummy variables) on the dependent variable. In the next chapter, the empirical findings are presented.

CHAPTER 4

EMPIRICAL RESULTS

4.1 The Long-Run Determinants of Idiosyncratic Risks

In the first step, the lower and upper bound critical values proposed by Pesaran et al. (2001), and Pesaran and Pesaran (1997) are used to determine the presence of cointegration relationship between variables. The calculated F-statistics are presented in Table 4.1. The F-statistics suggest cointegration for the ARDL estimates. The cointegration relationships appear to be stronger between the specialized idiosyncratic risks including information on the uncertainty about major markets and other variables than the cointegration between the idiosyncratic risks without information on the uncertainty and other variables (with only one exception of the cointegration between the idiosyncratic risk of large-growth value-weighted portfolios and other variables). Based on these results, in the next step, we continue with the ARDL procedure to find the long-run determinants of idiosyncratic risks.

Table 4.1 - Bounds testing procedure results

Panel A. Results for the idiosyncratic risk of portfolios

Idiosyncratic Risk	F Stat.
IRSGEP	6.085932***
IRSGVP	5.500387***
IRSVEP	12.11658***
IRSVVP	4.311071**
IRLGEP	10.58769***
IRLGVP	6.602874***
IRLVEP	6.507317***
IRLVVP	9.670193***

Panel B. Results for the specialized idiosyncratic risk of portfolios

Idiosyncratic Risk	F Stat.
SIRSGEP	13.90508***
SIRSGVP	6.695461***
SIRSVEP	15.43023***
SIRSVVP	4.709466***
SIRLGEP	14.74013***
SIRLGVP	5.91504***
SIRLVEP	19.68741***
SIRLVVP	10.40384***

Notes: Table 4.1 provides Bounds testing procedure results. For the ARDL models, the critical values are 2.45-3.61and 3.15-4.43 for 5%, and 1 % significance levels, respectively. Lags are determined based on SBC criterion. IRSGEP, IRSGVP, IRSVEP, IRSVVP, IRLGEP, IRLGVP, IRLVEP, IRLVVP represent the idiosyncratic risks of small-growth equally-weighted, small-growth value-weighted, small-value equally-weighted, small-value value-weighted, large-growth equally-weighted, large-growth value-weighted, large-value equally-weighted, large-value value-weighted portfolios, respectively. The initial letter "S" refers to the specialized idiosyncratic risk including uncertainty information in major financial and commodity markets (e.g. SIRSGEP is the idiosyncratic risk of small-growth equally-weighted portfolio including uncertainty information in major financial and commodity markets). Superscripts **, *** represents significance at 5% and 1% levels, respectively.

The ARDL estimation findings are presented to show the long-run determinants of the idiosyncratic risk of small-growth, small-value, large-growth, large-value portfolios in Table 4.2, 4.3, 4.4, and 4.5, respectively. The Newey-West standard errors with lags based on the SBC criteria are provided in the tables. We document consistent results with our hypotheses. Compared to business cycle variables (i.e. DEF, TERM, FF), funding liquidity conditions in interbank markets (TED) and changes in the US dollar value have stronger impacts on the idiosyncratic risk of all portfolios, especially when uncertainty information is accounted for. As expected in our first hypotheses, our findings indicate that uncertainty information on the conditional volatility of portfolio returns amplifies the importance of funding liquidity conditions in interbank markets as a key driver of idiosyncratic portfolio level risk. According to the results, the idiosyncratic risk of highly risky and equally-weighted portfolios is increased more by a deterioration of funding liquidity conditions than the idiosyncratic risk of less risky and value-weighted portfolios. The inclusion of the least liquid, lowest priced and smallest stocks in the equally-weighted portfolios intensifies the magnitude and significance of the impact of funding liquidity conditions on the idiosyncratic risks. Further, this impact of funding liquidity on the idiosyncratic risks is more intensified when the idiosyncratic risks include uncertainty in main financial and commodity markets. These results, consistent with Brunnermeier and Pedersen (2009), show the importance of deteriorating funding liquidity conditions in driving idiosyncratic risk through the negative impacts on market liquidity, especially in a highly uncertain economic environment.

The idiosyncratic risk of all portfolios without information on the uncertainty is unaffected by the fluctuations in the reserve currency (U.S. dollar) value. On the other hand, the increases in the US dollar value significantly increase the idiosyncratic risks of all portfolios with information on the uncertainty. This impact intensifies for more risky portfolios. The results confirm our second hypothesis. In a worsening global financial environment, the

significant US dollar appreciations point out financial distress in interbank markets (Maggiori, 2017). Hence, the US dollar appreciations may lead to lower stock market liquidity due to the use of US dollar for hedging purposes and thereby reducing the tendency of financial intermediaries to invest in risky assets. As a result, a considerable reduction in the risk-bearing capacity of financial intermediaries increases the idiosyncratic risks for volatile/illiquid portfolios in bad times. In sum, our findings imply that an increase in the reserve currency (U.S. dollar) value significantly intensifies the idiosyncratic risk of highly volatile/illiquid portfolios when information uncertainty in major financial and commodity markets is considered. This is due to fact that the US dollar is a valuable hedge against deteriorated funding liquidity conditions leading to less market liquidity in crisis periods.

More specifically, the impact of a US dollar appreciation is more pronounced on the idiosyncratic risk of large-value equally-weighted portfolios including information on the monetary policy uncertainty. Value firms are expected to pay high amounts of dividends. The volatility of equity returns could be directly proportional to the volatility of dividend news leading an investor to fear economic uncertainty (Campbell and Hentschel, 1992). Ambiguity about future dividends induces a risk premium for individual assets and market portfolio (Buraschi et al., 2014). Taken all together, the reason for the significant impact of the US dollar appreciations could be that the idiosyncratic risk of large-value equally-weighted portfolios contains a high amount of monetary policy uncertainty information, which may create serious uncertainties regarding future dividends.

Table 4.2 - Estimated long-run predictors of the idiosyncratic risks of small-growth portfolios

Panel A. Long-run predictors of the idiosyncratic risk of small-growth equally-weighted portfolios

Dependent variable: IRSGEP				Dependent variable: SIRSGEP			
EV	Coeff.	Std. Err.	T-ratio	EV	Coeff.	Std. Err.	T-ratio
TED	0.2727	0.0598	4.5602	TED	0.4351	0.0972	4.4753
△USD	-0.1288	0.0813	-1.585	△USD	0.3049	0.0585	5.2091
DEF	0.0821	0.074	1.1095	DEF	-0.0023	0.0597	-0.038
TERM	-0.0045	0.02	-0.228	TERM	0.0155	0.016	0.9701
FF	-0.0329	0.0402	-0.819	FF	-0.0726	0.0508	-1.429
△BCI	0.0001	0.000051	2.0644	△BCI	0.000013	0.000049	0.2651
C	0.1654	0.0802	2.0627	C	0.1535	0.054	2.8456

Panel B. Long-run predictors of the idiosyncratic risk of small-growth value-weighted portfolios

Dependent variable: IRSGVP				Dependent variable: SIRSGVP			
EV	Coeff.	Std. Err.	T-ratio	EV	Coeff.	Std. Err.	T-ratio
TED	0.09612	0.0311	3.092	TED	0.18977	0.0265	7.1534
△USD	0.00454	0.0247	0.1835	△USD	0.18468	0.054	3.4197
DEF	0.08898	0.0337	2.6391	DEF	0.03984	0.0316	1.2593
TERM	0.00949	0.0142	0.6679	TERM	0.0167	0.0128	1.3067
FF	0.04751	0.0266	1.7842	FF	0.01486	0.0194	0.7655
△BCI	-0.000027	0.000042	-0.649	△BCI	-0.000029	0.000036	-0.807
C	0.05398	0.0439	1.2291	C	0.06351	0.0344	1.8461

Notes: EV denotes the explanatory variables. The Newey-West (1987) autocorrelation and heteroskedasticity robust standard errors and t-statistics are presented. IRSGEP and IRSGVP represent the idiosyncratic risks of small-growth equally-weighted and small-growth value-weighted portfolios, respectively. The initial letter "S" refers to the specialized idiosyncratic risk including uncertainty information in major financial and commodity markets (e.g. SIRSGEP is the idiosyncratic risk of small-growth equally-weighted portfolio including uncertainty information in major financial and commodity markets). DEF and TERM refer to the default and term spreads, respectively. FF is the federal funds rate. △BCI is the percentage change of business condition index (Arouba et al., 2009). TED is the difference between 3-Month LIBOR based on US dollars and 3-Month Treasury Bill. △USD is the percentage change of the trade-weighted U.S. dollar index.

Table 4.3 - Estimated long-run predictors of the idiosyncratic risks of small-value portfolios

Panel A. Long-run predictors of the idiosyncratic risk of small-value equally-weighted portfolios

Dependent variable: IRSVEP				Dependent variable: SIRSVEP			
EV	Coeff.	Std. Err.	T-ratio	EV	Coeff.	Std. Err.	T-ratio
TED	0.1951	0.0372	5.2425	TED	0.2649	0.0419	6.3271
△USD	0.0203	0.0508	0.4005	△USD	0.1563	0.0652	2.3965
DEF	0.1451	0.035	4.1475	DEF	0.107	0.0409	2.6161
TERM	0.0506	0.0125	4.0619	TERM	0.0639	0.0142	4.4988
FF	0.0495	0.032	1.549	FF	0.0464	0.0305	1.5227
△BCI	0.0002	0.000056	3.2697	△BCI	0.0001	0.000038	2.8497
C	-0.0877	0.0413	-2.122	C	-0.1052	0.0466	-2.258

Panel B. Long-run predictors of the idiosyncratic risk of small-value value-weighted portfolios

Dependent variable: IRSVVP				Dependent variable: SIRSVVP			
EV	Coeff.	Std. Err.	T-ratio	EV	Coeff.	Std. Err.	T-ratio
TED	0.00336	0.0143	0.2355	TED	0.01797	0.0166	1.0799
△USD	-0.0119	0.0124	-0.96	△USD	0.0766	0.0282	2.7115
DEF	0.03139	0.0162	1.9366	DEF	0.02134	0.0187	1.1404
TERM	0.01902	0.0086	2.1991	TERM	0.02102	0.0082	2.5654
FF	0.02953	0.0139	2.1234	FF	0.03087	0.0114	2.7161
△BCI	0.00001	2E-05	0.4367	△BCI	-6E-06	2E-05	-0.367
C	0.00792	0.0222	0.3574	C	0.00697	0.022	0.3164

Notes: EV denotes the explanatory variables. The Newey-West (1987) autocorrelation and heteroskedasticity robust standard errors and t-statistics are presented. IRSVEP and IRSVVP represent the idiosyncratic risks of small-value equally-weighted and small-value value-weighted portfolios, respectively. The initial letter "S" refers to the specialized idiosyncratic risk including uncertainty information in major financial and commodity markets (e.g. SIRSVEP is the idiosyncratic risk of small-value equally-weighted portfolio including uncertainty information in major financial and commodity markets). DEF and TERM refer to the default and term spreads, respectively. FF is the federal funds rate. △BCI is the percentage change of business condition index (Arouba et al., 2009). TED is the difference between 3-Month LIBOR based on US dollars and 3-Month Treasury Bill. △USD is the percentage change of the trade-weighted U.S. dollar index.

Table 4.4 - Estimated long-run predictors of the the idiosyncratic risks of large-growth portfolios

Panel A. Long-run predictors of the idiosyncratic risk of large-growth equally-weighted portfolios

Dependent variable: IRLGEP				Dependent variable: SIRLGEP			
EV	Coeff.	Std. Err.	T-ratio	EV	Coeff.	Std. Err.	T-ratio
TED	0.1585	0.02497	6.3501	TED	0.18282	0.0227	8.0612
△USD	0.0322	0.01661	1.9392	△USD	0.16288	0.0449	3.6294
DEF	0.0246	0.02113	1.1635	DEF	0.02072	0.0158	1.3149
TERM	0.0029	0.00749	0.3838	TERM	0.00716	0.0054	1.3215
FF	-0.0166	0.01399	-1.1849	FF	-0.0368	0.0146	-2.5283
△BCI	0.000012	0.000023	0.5154	△BCI	-0.00001	0.000023	-0.4407
C	0.0992	0.0243	4.0807	C	0.08583	0.0166	5.18

Panel B. Long-run predictors of the idiosyncratic risk of large-growth value-weighted portfolios

Dependent variable: IRLGVP				Dependent variable: SIRLGVP			
EV	Coeff.	Std. Err.	T-ratio	EV	Coeff.	Std. Err.	T-ratio
TED	0.03307	0.0126	2.6291	TED	0.04026	0.0067	6.0493
△USD	0.02468	0.0129	1.92	△USD	0.0621	0.0157	3.9652
DEF	0.00911	0.0098	0.9248	DEF	0.01161	0.0058	2.0151
TERM	0.0072	0.0046	1.5809	TERM	0.00666	0.0028	2.3897
FF	0.02789	0.0135	2.0637	FF	0.01645	0.0106	1.5548
△BCI	0.000004	0.000012	0.3369	△BCI	-0.000007	0.000009	-0.837
C	0.05076	0.014	3.6229	C	0.04851	0.0094	5.1339

Notes: EV denotes the explanatory variables. The Newey-West (1987) autocorrelation and heteroskedasticity robust standard errors and t-statistics are presented. IRLGEP and IRLGVP represent the idiosyncratic risks of large-growth equally-weighted and large-growth value-weighted portfolios, respectively. The initial letter "S" refers to the specialized idiosyncratic risk including uncertainty information in major financial and commodity markets (e.g. SIRLGEP is the idiosyncratic risk of large-growth equally-weighted portfolio including uncertainty information in major financial and commodity markets). DEF and TERM refer to the default and term spreads, respectively. FF is the federal funds rate. △BCI is the percentage change of business condition index (Arouba et al., 2009). TED is the difference between 3-Month LIBOR based on US dollars and 3-Month Treasury Bill. △USD is the percentage change of the trade-weighted U.S. dollar index.

Table 4.5 - Estimated long-run predictors of the the idiosyncratic risks of large-value portfolios

Panel A. Long-run predictors of the idiosyncratic risk of large-value equally-weighted portfolios

Dependent variable: IRLVEP				Dependent variable: SIRLVEP			
EV	Coeff.	Std. Err.	T-ratio	EV	Coeff.	Std. Err.	T-ratio
TED	0.2477	0.0711	3.4835	TED	0.21133	0.0437	4.8352
△USD	0.1349	0.1036	1.3019	△USD	0.5309	0.1691	3.1394
DEF	0.0466	0.07215	0.6463	DEF	0.0579	0.049	1.1822
TERM	0.0077	0.02037	0.3776	TERM	0.01633	0.0162	1.0049
FF	0.0251	0.04188	0.6003	FF	0.07108	0.041	1.7344
△BCI	0.0002	0.000087	1.83	△BCI	0.000016	0.00004	0.4034
C	0.0824	0.07497	1.0996	C	0.04288	0.0557	0.7693

Panel B. Long-run predictors of the idiosyncratic risk of large-value value-weighted portfolios

Dependent variable: IRLVVP				Dependent variable: SIRLVVP			
EV	Coeff.	Std. Err.	T-ratio	EV	Coeff.	Std. Err.	T-ratio
TED	0.09703	0.0188	5.1631	TED	0.18212	0.0191	9.5514
△USD	-0.0226	0.0235	-0.9616	△USD	0.13479	0.0508	2.6537
DEF	0.1084	0.0226	4.7889	DEF	0.06565	0.0226	2.9072
TERM	0.03128	0.0118	2.6532	TERM	0.03716	0.0122	3.0348
FF	0.04842	0.0218	2.2173	FF	0.02677	0.0159	1.6838
△BCI	-0.000031	0.000033	-0.9519	△BCI	-0.000037	0.000032	-1.165
C	-0.0014	0.0316	-0.0455	C	0.00417	0.0295	0.1412

Notes: EV denotes the explanatory variables. The Newey-West (1987) autocorrelation and heteroskedasticity robust standard errors and t-statistics are presented. IRLVEP and IRLVVP represent the idiosyncratic risks of large-value equally-weighted and large-value value-weighted portfolios, respectively. The initial letter "S" refers to the specialized idiosyncratic risk including uncertainty information in major financial and commodity markets (e.g. SIRLVEP is the idiosyncratic risk of large-value equally-weighted portfolio including uncertainty information in major financial and commodity markets). DEF and TERM refer to the default and term spreads, respectively. FF is the federal funds rate. △BCI is the percentage change of business condition index (Arouba et al., 2009). TED is the difference between 3-Month LIBOR based on US dollars and 3-Month Treasury Bill. △USD is the percentage change of the trade-weighted U.S. dollar index.

Furthermore, the idiosyncratic risk of small-value equally-weighted portfolio is signficantly increased by business cycle fluctuations, such as an increase in default spread, term spread, and federal funds rate, more than the idiosyncratic risk of other portfolios. There could be various reasons behind that. On one hand, small-value equally-weighted portfolio is highly sensitive to worsening business conditions due to value firm characteristics. On the other hand, due to small firm characteristics, the difficulty of determining business and information risk plays a key role on the small-value equally-weighted portfolios' risk depending on the stages of business cycles. The changes in the business conditon index influence the idiosyncratic risk of small-growth equally-weighted and small-value equally-weighted portfolios but the size of this effect is relatively very low. Another interesting finding is that a reduction in federal funds rate increases the idiosyncratic risk of large-growth equally-weighted portfolios with uncertainty information. During recessionary periods, the Federal Reserve tends to reduce interest rates for stimulating economic activity. Hence, a reduction in federal funds rates may lead to unbalanced trading on large-growth stocks due to overreactions of investors during recessionary episodes.

4.2 Robustness Checks

As mentioned in the previous sections, we choose the Schwartz Bayesian criteria (SBC) suggested by Pesaran and Pesaran (1997) to determine the lag length of the variables in the ARDL model. For robustness, we also use the AIC (Akaike information criteria) to repeat the analyses. Results from different lag orders are not different from what we report in this study. The results are provided in Tables, 4.6, 4.7, 4.8, 4.9 and 4.10.

Table 4.6 - Bounds testing procedure results based on Akaike's Information Criteria (AIC)

Panel A. Results for the idiosyncratic risk of portfolios

Idiosyncratic Risk	F Stat.
IRSGEP	6.879331***
IRSGVP	6.364943***
IRSVEP	12.39371***
IRSVVP	6.312213***
IRLGEP	11.22606***
IRLGVP	6.641148***
IRLVEP	5.976793***
IRLVVP	10.3626***

Panel B. Results for the specialized idiosyncratic risk of portfolios

Idiosyncratic Risk	F Stat.
SIRSGEP	15.02261***
SIRSGVP	6.344353***
SIRSVEP	14.64071***
SIRSVVP	8.70212***
SIRLGEP	15.67849***
SIRLGVP	12.80835***
SIRLVEP	11.42499***
SIRLVVP	10.3506***

Note: See notes in Table. 4.1

Table 4.7 - Estimated long-run predictors based on Akaike's Information Criteria (AIC) for the idiosyncratic risks of small-growth portfolios

Panel A. Long-run predictors of the idiosyncratic risk of small-growth equally-weighted portfolios

Dependent variable: IRSGEP				Dependent variable: SIRSGEP			
EV	Coeff.	Std. Err.	T-ratio	EV	Coeff.	Std. Err.	T-ratio
TED	0.2903	0.0489	5.9408	TED	0.4516	0.0538	8.3965
△USD	-0.031	0.1171	-0.265	△USD	0.4102	0.1508	2.7195
DEF	0.0746	0.0397	1.8808	DEF	-0.0122	0.0444	-0.273
TERM	0.0032	0.0175	0.1845	TERM	0.0131	0.015	0.8765
FF	-0.0376	0.0242	-1.555	FF	-0.0745	0.0527	-1.415
△BCI	0.0001	0.0001	0.8851	△BCI	3E-05	6E-05	0.4722
C	0.1494	0.0485	3.0803	C	0.1631	0.0525	3.1083

Panel B. Long-run predictors of the idiosyncratic risk of small-growth value-weighted portfolios

Dependent variable: IRSGVP				Dependent variable: SIRSGVP			
EV	Coeff.	Std. Err.	T-ratio	EV	Coeff.	Std. Err.	T-ratio
TED	0.15758	0.0364	4.3273	TED	0.18567	0.0371	5.0029
△USD	-0.0444	0.0406	-1.095	△USD	0.18103	0.0466	3.8868
DEF	0.06245	0.0271	2.3016	DEF	0.0435	0.0261	1.6686
TERM	0.01714	0.0127	1.3504	TERM	0.02182	0.0121	1.7967
FF	0.02905	0.0178	1.6275	FF	0.02211	0.018	1.2301
△BCI	-2E-05	4E-05	-0.626	△BCI	-4E-05	4E-05	-0.915
C	0.04924	0.0346	1.4211	C	0.04747	0.033	1.4368

Note: See notes in Table 4.2

Table 4.8 - Estimated long-run predictors based on Akaike's Information Criteria (AIC) for the idiosyncratic risks of small-value portfolios

Panel A. Long-run predictors of the idiosyncratic risk of small-value equally-weighted portfolios

Dependent variable: IRSVEP				Dependent variable: SIRSVEP			
EV	Coeff.	Std. Err.	T-ratio	EV	Coeff.	Std. Err.	T-ratio
TED	0.1717	0.0349	4.9174	TED	0.2549	0.0345	7.3911
△USD	0.0922	0.1175	0.7853	△USD	0.2077	0.1515	1.3712
DEF	0.1676	0.0266	6.3061	DEF	0.1105	0.0323	3.4189
TERM	0.0535	0.0127	4.2051	TERM	0.0618	0.0156	3.9518
FF	0.0511	0.0316	1.6187	FF	0.0461	0.0302	1.526
△BCI	0.0002	6E-05	3.3452	△BCI	0.0001	4E-05	2.4787
C	-0.112	0.034	-3.291	C	-0.101	0.0463	-2.178

Panel B. Long-run predictors of the idiosyncratic risk of small-value value-weighted portfolios

Dependent variable: IRSVVP				Dependent variable: SIRSVVP			
EV	Coeff.	Std. Err.	T-ratio	EV	Coeff.	Std. Err.	T-ratio
TED	-0.005	0.0109	-0.455	TED	0.00727	0.0115	0.6338
△USD	0.05658	0.0276	2.0502	△USD	0.10885	0.0383	2.8435
DEF	0.03713	0.0097	3.845	DEF	0.03114	0.0091	3.4053
TERM	0.01924	0.0061	3.1437	TERM	0.02028	0.0059	3.458
FF	0.02909	0.0081	3.5737	FF	0.02802	0.007	4.0173
△BCI	5E-06	2E-05	0.2777	△BCI	-1E-05	1E-05	-0.674
C	0.0037	0.0149	0.2481	C	0.00236	0.0146	0.1616

Note: See notes in Table 4.3

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Table 4.9 - Estimated long-run predictors based on Akaike's Information Criteria (AIC) for the idiosyncratic risks of large-growth portfolios

Panel A. Long-run predictors of the idiosyncratic risk of large-growth equally-weighted portfolios

Dependent variable: IRLGEP				Dependent variable: SIRLGEP			
EV	Coeff.	Std. Err.	T-ratio	EV	Coeff.	Std. Err.	T-ratio
TED	0.1131	0.01768	6.4008	TED	0.20781	0.0323	6.4312
△USD	0.1049	0.03762	2.7886	△USD	0.31561	0.1048	3.0116
DEF	0.0499	0.01405	3.5543	DEF	0.00595	0.0238	0.2505
TERM	0.0042	0.00546	0.772	TERM	0.01291	0.008	1.6233
FF	-0.0107	0.00878	-1.224	FF	-0.0348	0.0177	-1.9618
△BCI	6E-06	2.1E-05	0.3056	△BCI	-2E-05	3E-05	-0.5285
C	0.0821	0.016	5.1335	C	0.07786	0.0194	4.0218

Panel B. Long-run predictors of the idiosyncratic risk of large-growth value-weighted portfolios

Dependent variable: IRLGVP				Dependent variable: SIRLGVP			
EV	Coeff.	Std. Err.	T-ratio	EV	Coeff.	Std. Err.	T-ratio
TED	0.01072	0.0132	0.8117	TED	0.03688	0.0052	7.1344
△USD	0.03067	0.0128	2.3969	△USD	0.0766	0.019	4.0354
DEF	0.01914	0.0088	2.169	DEF	0.01168	0.0053	2.1838
TERM	0.00707	0.004	1.7832	TERM	0.00769	0.0028	2.7734
FF	0.03687	0.0105	3.5166	FF	0.01968	0.007	2.8235
△BCI	3E-06	1E-05	0.2027	△BCI	-6E-06	9E-06	-0.613
C	0.04577	0.0113	4.052	C	0.04631	0.0085	5.4611

Note: See notes in Table 4.4

Table 4.10 - Estimated long-run predictors based on Akaike's Information Criteria (AIC) for the idiosyncratic risks of large-value portfolios

Panel A. Long-run predictors of the idiosyncratic risk of large-value equally-weighted portfolios

Dependent variable: IRLVEP				Dependent variable: SIRLVEP			
EV	Coeff.	Std. Err.	T-ratio	EV	Coeff.	Std. Err.	T-ratio
TED	0.1763	0.06162	2.8607	TED	0.13592	0.0499	2.7224
△USD	0.2035	0.13812	1.4735	△USD	0.53709	0.1683	3.1908
DEF	0.0819	0.06295	1.3015	DEF	0.0931	0.0377	2.4705
TERM	0.0062	0.0193	0.3203	TERM	0.01829	0.0168	1.0904
FF	0.0403	0.03756	1.072	FF	0.09424	0.0343	2.7455
△BCI	0.0002	7.2E-05	2.1617	△BCI	2.8E-05	4E-05	0.7053
C	0.0686	0.06557	1.0459	C	0.02042	0.0425	0.4809

Panel B. Long-run predictors of the idiosyncratic risk of large-value value-weighted portfolios

Dependent variable: IRLVVP				Dependent variable: SIRLVVP			
EV	Coeff.	Std. Err.	T-ratio	EV	Coeff.	Std. Err.	T-ratio
TED	0.12542	0.0206	6.0911	TED	0.14158	0.0212	6.6693
△USD	-0.0255	0.0384	-0.6641	△USD	0.11553	0.054	2.1402
DEF	0.09693	0.0181	5.3573	DEF	0.08755	0.0186	4.7149
TERM	0.03725	0.0096	3.8656	TERM	0.04131	0.0103	4.0286
FF	0.04027	0.0161	2.4957	FF	0.03899	0.0146	2.6624
△BCI	-3E-05	3E-05	-0.9822	△BCI	-4E-05	4E-05	-1.087
C	-0.0103	0.0238	-0.4316	C	-0.0179	0.0261	-0.686

Note: See notes in Table 4.5

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One could argue that if the conditional distribution assumption is changed, idiosyncratic risk estimates (Baillie and DeGennaro, 1990) and hence the long-run determinants of idiosyncratic risks may change. The stock returns are likely to exhibit fat tails. Therefore, we develop EGARCH models considering the existence of leptokurtosis and employing Student's t-distribution to estimate idiosyncratic risks. We observe the similar impacts of implied volatilities on conditional volatility of portfolio returns. The results are presented in Tables 4.11, 4.12, 4.13 and 4.14.

Table 4.11 - Variance equation parameter estimates based on Student's t-distribution for small-growth stocks

	Portfolio Excess Returns							
	SGEP-Rf				SGVP-Rf			
	No specification		With specification		No specification		With specification	
	Coeff.	Std. Err.	Coeff.	Std. Err.	Coeff.	Std. Err.	Coeff.	Std. Err.
β_0	-0.1092	0.0166	-0.061	0.0116	-0.141	0.0207	-0.1152	0.0185
χ	0.1223	0.0168	0.071	0.013	0.1413	0.0181	0.118	0.0173
Υ	-0.0113	0.0091	-7E-04	0.007	-0.025	0.0114	-0.0238	0.0104
β_h	0.9935	0.0031	0.9977	0.0016	0.9897	0.0036	0.9924	0.0029
dlvix			1.4289	0.272			0.5428	0.3163
dltyvix			-0.252	0.3295			0.0313	0.3572
dlevz			0.3897	0.319			-0.0827	0.3863
dlovx			-0.122	0.3092			0.5831	0.3585
dlgvz			0.066	0.3197			0.1973	0.3389
Estimation output								
Loglikelihood	-675.68		-648.3		295.83		304.81	
AIC	0.5781		0.5595		-0.241		-0.2445	

Note: See notes in Table 3.2

Table 4.12 - Variance equation parameter estimates based on Student's t-distribution for small-value stocks

	Portfolio Excess Returns							
	SVEP-Rf				SVVP-Rf			
	No specification		With specification		No specification		With specification	
	Coeff.	Std. Err.	Coeff.	Std. Err.	Coeff.	Std. Err.	Coeff.	Std. Err.
β_0	-0.1165	0.0171	-0.079	0.0138	-0.148	0.0267	-0.11	0.0213
χ	0.1351	0.0182	0.095	0.0157	0.1281	0.0187	0.0982	0.0165
γ	-0.028	0.0069	-0.017	0.0063	0.0157	0.0105	0.0099	0.0099
β_h	0.995	0.0025	0.9978	0.0017	0.9901	0.0038	0.993	0.0028
dlvix			0.7749	0.2808			0.1596	0.2667
dltyvix			0.0045	0.3511			0.1991	0.3623
dlevz			0.2768	0.3484			0.1836	0.3585
dlovx			0.2223	0.352			0.0672	0.3247
dlgvz			0.039	0.3365			0.7495	0.3287
Estimation output								
Loglikelihood	-132.15		-122.4		2252.2		2259.9	
AIC	0.1199		0.1159		-1.891		-1.894	

Note: See notes in Table 3.3

Table 4.13 - Variance equation parameter estimates based on Student's t-distribution for large-growth stocks

	Portfolio Excess Returns							
	LGEP-Rf				LGVP-Rf			
	No specification		With specification		No specification		With specification	
	Coeff.	Std. Err.	Coeff.	Std. Err.	Coeff.	Std. Err.	Coeff.	Std. Err.
β_0	-0.143	0.0217	-0.042	0.0102	-0.09	0.02	-0.047	0.0124
χ	0.1397	0.0184	0.0453	0.0104	0.0687	0.0142	0.0328	0.0105
Υ	-0.035	0.0123	-0.017	0.0075	0.0247	0.0093	0.0128	0.007
β_h	0.9897	0.0037	0.998	0.0012	0.9922	0.0029	0.9954	0.0016
dlvix			1.2918	0.2555			0.505	0.2478
dltyvix			0.1194	0.2977			0.0724	0.3128
dlevz			-0.052	0.2921			-0.079	0.2892
dlovx			0.0797	0.2838			0.0041	0.2674
dlgvz			0.5185	0.3033			0.4932	0.2646
Estimation output								
Loglikelihood	698.53		727.76		2164.1		2172.8	
AIC	-0.581		-0.601		-1.816		-1.82	

Note: See notes in Table 3.4

Table 4.14 - Variance equation parameter estimates based on Student's t-distribution for large-value stocks

	Portfolio Excess Returns							
	LVEP-Rf				LVVP-Rf			
	No specification		With specification		No specification		With specification	
	Coeff.	Std. Err.	Coeff.	Std. Err.	Coeff.	Std. Err.	Coeff.	Std. Err.
β_0	-0.098	0.0148	-0.037	0.0092	-0.1451	0.0212	-0.1161	0.0183
χ	0.1095	0.0156	0.0451	0.0106	0.1474	0.0182	0.1223	0.017
γ	-0.041	0.0094	-0.029	0.0062	-0.0174	0.0114	-0.0151	0.0102
β_h	0.9952	0.0021	0.9991	0.0009	0.9895	0.0037	0.9928	0.0028
dlvix			0.3097	0.2411			0.3078	0.3293
dltyvix			0.8653	0.3029			0.0994	0.3491
dlevz			-0.384	0.2947			-0.1689	0.3799
dlovx			0.2627	0.2704			0.6091	0.371
dlgvz			1.0322	0.2831			0.9043	0.3431
Estimation output								
Loglikelihood	21.969		43.141		141.92		155.31	
AIC	-0.01		-0.024		-0.1112		-0.1184	

Note: See notes in Table 3.5

After deriving new idiosyncratic risks based on Student's t-distribution, we estimate the ARDL models to obtain the long-run determinants of new derived idiosyncratic risks and find similar results. These estimations are made using the AIC and SBC information criteria and are reported in Tables 4.15, 4.16, 4.17, 4.18, 4.19, 4.20, 4.21, 4.22, 4.23, and 4.24.

Table 4.15 - Bounds testing procedure results based on Schwarz Bayesian Criterion (SBC) for the idiosyncratic risks obtained using Student's t-distribution

Panel A. Results for the idiosyncratic risk of portfolios

Idiosyncratic Risk	F Stat.
IRSGEP	6.009937***
IRSGVP	4.991291***
IRSVEP	11.96754***
IRSVVP	4.092917***
IRLGEP	10.66548***
IRLGVP	6.509923***
IRLVEP	6.508186***
IRLVVP	7.335735***

Panel B. Results for the specialized idiosyncratic risk of portfolios

Idiosyncratic Risk	F Stat.
SIRSGEP	12.64794***
SIRSGVP	6.541567***
SIRSVEP	17.96333***
SIRSVVP	4.711167***
SIRLGEP	15.22339***
SIRLGVP	6.142672***
SIRLVEP	18.38595***
SIRLVVP	8.364045***

Note: See notes in Table 4.1

Table 4.16 - Estimated long-run predictors based on Schwarz Bayesian Criterion (SBC) for the idiosyncratic risks of small-growth portfolios obtained using Student's t-distribution

Panel A. Long-run predictors of the idiosyncratic risk of small-growth equally-weighted portfolios

Dependent variable: IRSGEP				Dependent variable: SIRSGEP			
EV	Coeff.	Std. Err.	T-ratio	EV	Coeff.	Std. Err.	T-ratio
TED	0.2876	0.0608	4.7276	TED	0.3793	0.0853	4.4453
△USD	-0.1314	0.0812	-1.619	△USD	0.2884	0.0646	4.4647
DEF	0.0667	0.0737	0.9053	DEF	0.0276	0.0422	0.6535
TERM	-0.0027	0.0203	-0.135	TERM	0.0122	0.0149	0.8204
FF	-0.0332	0.0412	-0.807	FF	-0.0631	0.0424	-1.491
△BCI	0.0001	5E-05	2.1536	△BCI	1E-05	5E-05	0.2957
C	0.1716	0.0809	2.1211	C	0.1451	0.0476	3.0484

Panel B. Long-run predictors of the idiosyncratic risk of small-growth value-weighted portfolios

Dependent variable: IRSGVP				Dependent variable: SIRSGVP			
EV	Coeff.	Std. Err.	T-ratio	EV	Coeff.	Std. Err.	T-ratio
TED	0.09768	0.0323	3.0271	TED	0.18955	0.026	7.3008
△USD	0.00571	0.0251	0.2275	△USD	0.18838	0.0513	3.6742
DEF	0.0864	0.0354	2.4398	DEF	0.03795	0.0317	1.1981
TERM	0.00957	0.0147	0.6514	TERM	0.01727	0.0126	1.3685
FF	0.05063	0.0286	1.7694	FF	0.01536	0.0196	0.7823
△BCI	-3E-05	4E-05	-0.588	△BCI	-2E-05	4E-05	-0.686
C	0.05477	0.0459	1.1933	C	0.06386	0.0344	1.8552

Note: See notes in Table 4.2

Table 4.17 - Estimated long-run predictors based on Schwarz Bayesian Criterion (SBC) for the idiosyncratic risks of small-value portfolios obtained using Student's t-distribution

Panel A. Long-run predictors of the idiosyncratic risk of small-value equally-weighted portfolios

Dependent variable: IRSVEP				Dependent variable: SIRSVEP			
EV	Coeff.	Std. Err.	T-ratio	EV	Coeff.	Std. Err.	T-ratio
TED	0.193	0.0376	5.1347	TED	0.2084	0.0357	5.8434
△USD	0.0275	0.05	0.5493	△USD	0.2779	0.0768	3.6171
DEF	0.1353	0.035	3.8683	DEF	0.1257	0.0393	3.197
TERM	0.0495	0.0124	3.9906	TERM	0.0583	0.0141	4.14
FF	0.0496	0.0331	1.4967	FF	0.0532	0.0362	1.4687
△BCI	0.0002	5E-05	3.2423	△BCI	0.0001	4E-05	2.9615
C	-0.0752	0.0417	-1.805	C	-0.0966	0.0486	-1.99

Panel B. Long-run predictors of the idiosyncratic risk of small-value value-weighted portfolios

Dependent variable: IRSVVP				Dependent variable: SIRSVVP			
EV	Coeff.	Std. Err.	T-ratio	EV	Coeff.	Std. Err.	T-ratio
TED	0.00531	0.0145	0.3666	TED	0.01335	0.0165	0.8085
△USD	-0.0123	0.0126	-0.976	△USD	0.07102	0.0269	2.6383
DEF	0.02959	0.0167	1.7741	DEF	0.02274	0.0193	1.1814
TERM	0.01834	0.0087	2.1092	TERM	0.02055	0.0082	2.4965
FF	0.02808	0.0137	2.0438	FF	0.03212	0.0126	2.5454
△BCI	1.2E-05	2E-05	0.513	△BCI	-5E-06	2E-05	-0.331
C	0.01098	0.0222	0.4959	C	0.00773	0.0225	0.3441

Note: See notes in Table 4.3

Table 4.18 - Estimated long-run predictors based on Schwarz Bayesian Criterion (SBC) for the idiosyncratic risks of large-growth portfolios obtained using Student's t-distribution

Panel A. Long-run predictors of the idiosyncratic risk of large-growth equally-weighted portfolios

Dependent variable: IRLGEP				Dependent variable: SIRLGEP			
EV	Coeff.	Std. Err.	T-ratio	EV	Coeff.	Std. Err.	T-ratio
TED	0.1641	0.02614	6.2802	TED	0.19167	0.0246	7.792
△USD	0.0303	0.01621	1.8722	△USD	0.16507	0.0474	3.481
DEF	0.0273	0.02189	1.2489	DEF	0.02036	0.0168	1.2153
TERM	0.0028	0.00764	0.372	TERM	0.00708	0.0055	1.2888
FF	-0.0178	0.01478	-1.2037	FF	-0.0395	0.0148	-2.6659
△BCI	1E-05	2.5E-05	0.4663	△BCI	-1E-05	2E-05	-0.5154
C	0.095	0.02512	3.7832	C	0.08414	0.0167	5.0403

Panel B. Long-run predictors of the idiosyncratic risk of large-growth value-weighted portfolios

Dependent variable: IRLGVP				Dependent variable: SIRLGVP			
EV	Coeff.	Std. Err.	T-ratio	EV	Coeff.	Std. Err.	T-ratio
TED	0.03246	0.0123	2.6314	TED	0.04059	0.0045	8.9576
△USD	0.02516	0.0128	1.9651	△USD	0.05839	0.0152	3.8367
DEF	0.00864	0.0098	0.8851	DEF	0.01142	0.0053	2.1606
TERM	0.00716	0.0045	1.5766	TERM	0.00666	0.0026	2.5969
FF	0.02779	0.0135	2.0577	FF	0.01564	0.0084	1.8705
△BCI	3E-06	1E-05	0.2731	△BCI	-8E-06	8E-06	-0.921
C	0.05157	0.014	3.6872	C	0.04898	0.0087	5.6119

Note: See notes in Table 4.4

Table 4.19 - Estimated long-run predictors based on Schwarz Bayesian Criterion (SBC) for the idiosyncratic risks of large-value portfolios obtained using Student's t-distribution

Panel A. Long-run predictors of the idiosyncratic risk of large-value equally-weighted portfolios

Dependent variable: IRLVEP				Dependent variable: SIRLVEP			
EV	Coeff.	Std. Err.	T-ratio	EV	Coeff.	Std. Err.	T-ratio
TED	0.2541	0.07335	3.4649	TED	0.19212	0.0423	4.5438
△USD	0.1291	0.10233	1.2614	△USD	0.49447	0.1654	2.9902
DEF	0.0452	0.07193	0.6279	DEF	0.07727	0.0448	1.7264
TERM	0.0075	0.02056	0.3654	TERM	0.01512	0.0151	1.0025
FF	0.0228	0.04224	0.5406	FF	0.06671	0.0365	1.829
△BCI	0.0002	8.9E-05	1.8304	△BCI	3.7E-05	4E-05	0.9707
C	0.0829	0.0751	1.1043	C	0.03359	0.0514	0.653

Panel B. Long-run predictors of the idiosyncratic risk of large-value value-weighted portfolios

Dependent variable: IRLVVP				Dependent variable: SIRLVVP			
EV	Coeff.	Std. Err.	T-ratio	EV	Coeff.	Std. Err.	T-ratio
TED	0.11274	0.0234	4.8123	TED	0.20634	0.025	8.264
△USD	-0.0248	0.0277	-0.8955	△USD	0.15485	0.0625	2.4783
DEF	0.10436	0.0286	3.649	DEF	0.05762	0.026	2.2156
TERM	0.03182	0.0127	2.5011	TERM	0.03887	0.0135	2.8869
FF	0.05236	0.0261	2.007	FF	0.02875	0.0188	1.5315
△BCI	-3E-05	4E-05	-0.8763	△BCI	-4E-05	3E-05	-1.358
C	-0.0054	0.0358	-0.1523	C	-0.0008	0.0318	-0.026

Note: See notes in Table 4.5

Table 4.20 - Bounds testing procedure results based on Akaike's Information Criteria (AIC) for the idiosyncratic risks obtained using Student's t-distribution

Panel A. Results for the idiosyncratic risk of portfolios

Idiosyncratic Risk	F Stat.
IRSGEP	6.602052***
IRSGVP	5.909863***
IRSVEP	12.17743***
IRSVVP	6.304088***
IRLGEP	11.31846***
IRLGVP	6.493242***
IRLVEP	5.854038***
IRLVVP	8.285572***

Panel B. Results for the specialized idiosyncratic risk of portfolios

Idiosyncratic Risk	F Stat.
SIRSGEP	15.22286***
SIRSGVP	6.18272***
SIRSVEP	13.75035***
SIRSVVP	8.280091***
SIRLGEP	16.23646***
SIRLGVP	12.82259***
SIRLVEP	11.66539***
SIRLVVP	9.290814***

Note: See notes in Table 4.1

Table 4.21 - Estimated long-run predictors based on Akaike's Information Criteria (AIC) for the idiosyncratic risks of small-growth portfolios obtained using Student's t-distribution

Panel A. Long-run predictors of the idiosyncratic risk of small-growth equally-weighted portfolios

Dependent variable: IRSGEP				Dependent variable: SIRSGEP			
EV	Coeff.	Std. Err.	T-ratio	EV	Coeff.	Std. Err.	T-ratio
TED	0.2874	0.0512	5.6148	TED	0.4191	0.0473	8.8617
△USD	-0.0153	0.1084	-0.141	△USD	0.4217	0.151	2.7927
DEF	0.0666	0.0373	1.7835	DEF	-0.005	0.0391	-0.128
TERM	0.0043	0.0173	0.2487	TERM	0.0117	0.0146	0.8052
FF	-0.0347	0.0241	-1.437	FF	-0.064	0.0459	-1.393
△BCI	0.0001	0.0001	0.9028	△BCI	3E-05	5E-05	0.5157
C	0.1546	0.0466	3.3202	C	0.1661	0.0474	3.5026

Panel B. Long-run predictors of the idiosyncratic risk of small-growth value-weighted portfolios

Dependent variable: IRSGVP				Dependent variable: SIRSGVP			
EV	Coeff.	Std. Err.	T-ratio	EV	Coeff.	Std. Err.	T-ratio
TED	0.15592	0.0377	4.1387	TED	0.18907	0.0369	5.1256
△USD	-0.0411	0.0421	-0.976	△USD	0.18656	0.0445	4.1925
DEF	0.06173	0.0279	2.2139	DEF	0.04013	0.0264	1.5227
TERM	0.01742	0.013	1.3434	TERM	0.02219	0.0122	1.815
FF	0.03186	0.0185	1.7211	FF	0.02184	0.0182	1.1974
△BCI	-2E-05	4E-05	-0.548	△BCI	-3E-05	4E-05	-0.822
C	0.04885	0.0355	1.3749	C	0.04877	0.0331	1.4712

Note: See notes in Table 4.2

Table 4.22 - Estimated long-run predictors based on Akaike's Information Criteria (AIC) for the idiosyncratic risks of small-value portfolios obtained using Student's t-distribution

Panel A. Long-run predictors of the idiosyncratic risk of small-value equally-weighted portfolios

Dependent variable: IRSVEP				Dependent variable: SIRSVEP			
EV	Coeff.	Std. Err.	T-ratio	EV	Coeff.	Std. Err.	T-ratio
TED	0.167	0.0356	4.6855	TED	0.2285	0.0337	6.7702
△USD	0.1046	0.1112	0.9402	△USD	0.2586	0.1318	1.9626
DEF	0.1587	0.0267	5.9468	DEF	0.1201	0.0277	4.3392
TERM	0.0524	0.0123	4.2591	TERM	0.0616	0.0131	4.6989
FF	0.0518	0.0314	1.6489	FF	0.0482	0.0292	1.6475
△BCI	0.0002	5E-05	3.3422	△BCI	0.0001	4E-05	2.7493
C	-0.0998	0.0334	-2.987	C	-0.1039	0.0388	-2.674

Panel B. Long-run predictors of the idiosyncratic risk of small-value value-weighted portfolios

Dependent variable: IRSVVP				Dependent variable: SIRSVVP			
EV	Coeff.	Std. Err.	T-ratio	EV	Coeff.	Std. Err.	T-ratio
TED	-0.0044	0.0112	-0.396	TED	0.00925	0.0116	0.7981
△USD	0.06272	0.0284	2.2104	△USD	0.10593	0.0392	2.7054
DEF	0.03606	0.0094	3.8165	DEF	0.02987	0.0092	3.2574
TERM	0.01821	0.0061	2.9809	TERM	0.02003	0.0059	3.4096
FF	0.02771	0.0082	3.36	FF	0.02694	0.0069	3.8975
△BCI	7E-06	2E-05	0.3514	△BCI	-1E-05	1E-05	-0.677
C	0.00724	0.0146	0.4948	C	0.00387	0.0145	0.2667

Note: See notes in Table 4.3

Table 4.23 - Estimated long-run predictors based on Akaike's Information Criteria (AIC) for the idiosyncratic risks of large-growth portfolios obtained using Student's t-distribution

Panel A. Long-run predictors of the idiosyncratic risk of large-growth equally-weighted portfolios

Dependent variable: IRLGEP				Dependent variable: SIRLGEP			
EV	Coeff.	Std. Err.	T-ratio	EV	Coeff.	Std. Err.	T-ratio
TED	0.1163	0.018	6.4625	TED	0.21707	0.0341	6.3567
△USD	0.1075	0.03815	2.8175	△USD	0.32188	0.1056	3.0485
DEF	0.0541	0.01458	3.7087	DEF	0.00512	0.0247	0.2073
TERM	0.0042	0.00557	0.7569	TERM	0.01314	0.008	1.6367
FF	-0.0118	0.00924	-1.2733	FF	-0.0373	0.0179	-2.0877
△BCI	5E-06	2.3E-05	0.2004	△BCI	-2E-05	3E-05	-0.5915
C	0.0772	0.01641	4.704	C	0.07577	0.0197	3.8465

Panel B. Long-run predictors of the idiosyncratic risk of large-growth value-weighted portfolios

Dependent variable: IRLGVP				Dependent variable: SIRLGVP			
EV	Coeff.	Std. Err.	T-ratio	EV	Coeff.	Std. Err.	T-ratio
TED	0.01004	0.0132	0.7609	TED	0.03826	0.0049	7.8511
△USD	0.03113	0.0131	2.3847	△USD	0.07443	0.0194	3.8334
DEF	0.01862	0.0088	2.1264	DEF	0.01087	0.0053	2.0475
TERM	0.00702	0.004	1.7685	TERM	0.00767	0.0027	2.833
FF	0.03683	0.0105	3.5026	FF	0.01888	0.0066	2.876
△BCI	2E-06	1E-05	0.1463	△BCI	-6E-06	9E-06	-0.702
C	0.04665	0.0114	4.1055	C	0.04707	0.0081	5.8447

Note: See notes in Table 4.4

Table 4.24 - Estimated long-run predictors based on Akaike's Information Criteria (AIC) for the idiosyncratic risks of large-value portfolios obtained using Student's t-distribution

Panel A. Long-run predictors of the idiosyncratic risk of large-value equally-weighted portfolios

Dependent variable: IRLVEP				Dependent variable: SIRLVEP			
EV	Coeff.	Std. Err.	T-ratio	EV	Coeff.	Std. Err.	T-ratio
TED	0.1812	0.06181	2.9322	TED	0.14455	0.0494	2.9281
△USD	0.1976	0.13689	1.4433	△USD	0.54488	0.1717	3.1731
DEF	0.0815	0.06259	1.3019	DEF	0.09087	0.0384	2.3694
TERM	0.006	0.01941	0.3109	TERM	0.01769	0.016	1.1058
FF	0.0382	0.03783	1.0099	FF	0.09038	0.0349	2.5926
△BCI	0.0002	7.4E-05	2.153	△BCI	0.00004	4E-05	0.999
C	0.0684	0.0657	1.0408	C	0.0221	0.041	0.5388

Panel B. Long-run predictors of the idiosyncratic risk of large-value value-weighted portfolios

Dependent variable: IRLVVP				Dependent variable: SIRLVVP			
EV	Coeff.	Std. Err.	T-ratio	EV	Coeff.	Std. Err.	T-ratio
TED	0.11283	0.0244	4.6164	TED	0.16083	0.0254	6.3321
△USD	-0.0174	0.038	-0.457	△USD	0.15158	0.061	2.4864
DEF	0.1069	0.0217	4.9363	DEF	0.08396	0.021	3.9971
TERM	0.03913	0.0108	3.6378	TERM	0.0433	0.011	3.9449
FF	0.04869	0.0187	2.6039	FF	0.03979	0.0164	2.43
△BCI	-3E-05	4E-05	-0.827	△BCI	-5E-05	4E-05	-1.213
C	-0.0232	0.0269	-0.8635	C	-0.0264	0.0282	-0.938

Note: See notes in Table 4.5

CHAPTER 5

CONCLUSION

Financial intermediaries play an important role in providing market liquidity and hence affecting dynamic relationships between asset markets. The attitude of financial intermediaries toward buying and/or selling volatile (illiquid) stocks strongly influences the demand-supply mechanism in stock markets due to their huge holdings. This attitude varies depending on changing global economic circumstances. Therefore, risky portfolios can be quickly affected by market news based on information on the uncertainty about major markets leading to the risk-adjusting changes in the asset allocation decisions of financial intermediaries. In this regard, the limited risk-bearing capacity of financial intermediaries is of key importance in affecting global market dynamics. Taking into account this central role of financial intermediaries in global asset markets, we investigate whether fluctuating uncertainty in main financial and commodity markets has an impact on the economic mechanisms through which changes in the risk-bearing capacity of financial intermediaries drive idiosyncratic risk. To this end, the specified economic mechanisms in this study are identified based on economic theories from the literature.

According to our results, a worsening in the level of the risk-bearing capacity of financial intermediaries increases the level of idiosyncratic risks in a changing and dynamic economic environment. This increase is more pronounced for the idiosyncratic risks of high volatile portfolios (e.g. equally weighted portfolios). More importantly, we observe that uncertainties in major financial and commodity markets are the underlying sources of idiosyncratic volatility, causing the changes in the risk-bearing capacity of financial intermediaries to influence idiosyncratic risks more. In our framework, it appears that deteriorated funding liquidity conditions in interbank markets more strongly enhance idiosyncratic risks when financial intermediaries relate an increase in uncertainty

to worsening investment opportunities due to unfavorable fluctuations in global markets.

Our results imply that increased financial constraints of financial intermediaries are causing market inefficiency due to increased financial frictions (e.g. informational loss, information asymmetry) in an uncertain economic environment. Uncertainty in major markets increases information risk, liquidity risk and hence transaction costs, which are considered as speculators' shadow cost of capital (Brunnnermeier and Pedersen, 2009) leading to more illiquid stock markets and higher hedging motives. As a result of this mechanism, especially illiquid and highly volatile stocks, which inherently have more information risk, are strongly influenced by a negative shock to interbank loan markets in an uncertain environment. Overall, we provide evidence on the role of hedging demands in determining the impacts of deteriorated funding conditions in interbank loan markets on idiosyncratic risk through uncertainty.

Capturing the magnitude and timing of risk premium induced by idiosyncratic risks is of central importance for optimal asset allocation structures since investors seek for better hedging opportunities for idiosyncratic volatility exposure. A rigorous investigation on how an economic mechanism will change the behavior of volatile portfolios is very important in developing optimal hedging strategies. Therefore, determining the convenient allocation of risky stocks (e.g. small stocks) in a portfolio pushes investors to carefully follow macroeconomic fluctuations. Volatile financial environment makes it quite difficult to value risky stocks and hence to determine proper investment strategies. Our results point out that the increased idiosyncratic volatility promoted by a deterioration in funding liquidity conditions in interbank markets prevents forming well-diversified portfolios easily via reducing market liquidity, particularly under uncertain economic conditions. This finding emphasizes that understanding economic transmission mechanisms between cyclical changes in the risk-bearing capacity of financial intermediaries and idiosyncratic risks would enable market players to determine more sophisticated hedging and investment

strategies. In sum, ignoring the role of financial intermediaries in increasing financial market frictions in asset markets, which significantly impacts risky assets, inhibits proper asset allocation strategies, especially during high uncertainty episodes.

Our findings provide empirical support for the theoretical predictions of Brunnermeier and Pedersen (2009) and Maggiori (2017). However, there is a need for a more comprehensive theoretical framework considering detailed uncertainty information to better understand the transmission channels between macroeconomic fluctuations influencing financial intermediaries and idiosyncratic risks. Our study could be extended employing international data to focus on other developed and emerging markets. Also, rather than size and value strategies, the idiosyncratic risk of portfolios formed based on other investment strategies (e.g. size and profitability strategies) might be further studied. Finally, future research may concentrate on the role of the equity constraints of financial intermediaries in determining the idiosyncratic risks instead of the debt constraints examined in this study.

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APPENDICES

A. CURRICULUM VITAE

PERSONAL INFORMATION

Surname, Name: Kocaarslan, Barış
Nationality: Turkish (TC)
email: bariskocaarslan@gmail.com

EDUCATION

2013 **Middle East Technical University**
MBA. Business Administration

2008 **Anadolu University**
BSc. Business Administration

2007 **Erciyes University**
BSc. Aircraft Electrical and Electronics

WORK EXPERIENCE

MIDDLE EAST TECHNICAL UNIVERSITY
12.2011 –
Business Administration, Research Assistant

YALOVA UNIVERSITY
12.2010 – 12.2011
Business Administration, Research Assistant

VAKIFBANK
08.2009 - 12.2010
Assistant Specialist

HALKBANK
12.2008 - 08.2009
Serviceman

ARTICLES

1.Kocaarslan, B., Sari, R., & Soytas, U. (2017). Are There Any Diversification Benefits Among Global Finance Center Candidates in Eurasia?. Emerging Markets Finance and Trade, 53(2), 357-374. (SSCI & Scopus).

2.Kocaarslan, B., Sari, R., Gormus, A., & Soytas, U. (2017). Dynamic correlations between BRIC and US stock markets: The asymmetric impact of volatility expectations in oil, gold and financial markets. Journal of Commodity Markets, 7, 41-56. (ESCI & Scopus).

3.Kocaarslan, B., Soytas, U., Sari, R., & Ugurlu, E. (2018). The Changing Role of Financial Stress, Oil Price, and Gold Price on Financial Contagion among US and BRIC Markets. International Review of Finance. (Forthcoming) (SSCI & Scopus).

BOOK CHAPTERS

1.Kocaarslan, B., 2016. "Volatility Spill-Overs and Asymmetric Correlations Between Global Finance Center Candidates In Eurasia Region And US Markets" in İ. Siriner, J. Dobreva and Çiğdem Boz (eds), Political Economy of Globalization, Financialization & Crises, London: IJOPEC Publication.

CONFERENCE PRESENTATIONS

1.Kocaarslan, B., 2015. “International Equity Diversification Benefits: New Evidence From Two Emerging Markets (Turkey And Russia) In Eurasia Region For International Investors ” First World Congress of Comparative Economics. Rome, Italy.

2.Kocaarslan, B., 2016. "Volatility Spill-Overs and Asymmetric Correlations Between Global Finance Center Candidates In Eurasia Region And US Markets" 7th International Conference of Political Economy. Istanbul, Turkey

3.Kocaarslan, B., Soytas, U., Sari, R., 2016 “Volatility expectations and BRIC and US market comovements” 4th International Academic Conference in Paris (IACP). Paris, France.

4.Cavlak, Ö., Kocaarslan B., 2016 “An Examination of Schwartz's Cultural Values In Terms of Social Progress Index” 2nd International Conference On The Changing World And Social Research. Barcelona, Spain.

5.Kocaarslan, B., 2017. “Amerika Birleşik Devletleri (ABD) Piyasalarindaki Finansal Stresin Borsa İstanbul Üzerindeki Etkileri”, Gazi Akademi Genç Sosyal Bilimciler Sempozyumu, 9 -10 Mart 2017, Ankara, Turkey.

RESEARCH AWARDS

“ODTÜ Geliştirme Vakfı, 2017”, Publication award

LANGUAGE

English *Advanced*

B. TURKISH SUMMARY/ TÜRKÇE ÖZET

1. Giriş

Literatürde kendine özgü risklerin (sistematik olmayan) nasıl çeşitlendirileceği konusu artan bir şekilde akademisyenlerin ve piyasa oyuncularının ilgisini çekmekte ve sıcak bir tartışmanın konusu olmaya devam etmektedir. Finansal varlık fiyatlama modeli (CAPM), kendine özgü risklerin varlıkları çeşitlendirme yoluyla tamamen ortadan kalktığını öngörmektedir. Ancak, bu modelde, piyasadaki oyuncuların tam bilgiye sahip olması gibi varsayımlar gerçeği yansıtmamaktadır (Merton, 1987). Mükemmel çeşitlendirilmiş portföylerin oluşturulması, çeşitli risk faktörleri ile ilgili (örneğin, işlem maliyetleri ve likidite) bazı nedenlerden dolayı mümkün değildir (Levy, 1978; Merton, 1987; Malkiel ve Xu, 2001). Yatırımcılar kendi portföylerini başarılı bir şekilde çeşitlendiremedikleri için volatilite riski sadece piyasadaki dalgalanmalara değil, aynı zamanda portföy ve varlıkların kendine özgü risklerine de bağlıdır (Campbell ve ark., 2001). Mükemmel bir şekilde çeşitlendirilmiş piyasa portföyünün elde edilmesinin imkansızlığı, yatırımcıların risklerini farklı varlıklara yeterince yayamadıkları için daha fazla getiri talep etmesine neden olmaktadır (Merton, 1987; Bali ve Cakici, 2008).

Varlıkların ve portföylerin kendine özgü riskleri ve dolayısıyla çeşitlendirme fırsatları, risk profillerine bağlı olarak yatırımcıların değişen yatırım stratejilerinden etkilenmektedir (Levy, 1978). Bu yatırımcılar arasında finansal aracılar, çeşitli varlık sınıfları üzerinde hızlı bir şekilde işlem yapabilme avantajlarından dolayı birincil öneme sahiptir (He ark., 2017). Finansal aracıların varlık piyasalarındaki kilit rolüne ilişkin ciddi kuramsal argümanlara rağmen (ör. Brunnermeier ve Pedersen, 2009; Maggiori, 2017), bildiğimiz kadarı ile, literatürde finansal aracıların risk taşıma kapasitesindeki değişimlerin kendine özgü riskler (özel durumlardan kaynaklanan riskler) üzerindeki etkilerini inceleyen ampirik bir çalışma yoktur. Bankalararası piyasalardaki fonlama

likidite koşullarındaki ve rezerv para birimi (ABD doları) değerindeki değişiklikler, Brunnermeier ve Pedersen (2009) ve Maggiori (2017) 'nin kuramsal iddialarına dayanarak finansal aracıların risk taşıma kapasitelerindeki değişikliklerin temsilcisi olarak kullanılabilir. Buradan hareketle, konjönktür dalgalanmalarını göz önünde bulundurarak, bu çalışmanın temel amacı fonlama likidite koşullarının ve rezerv para birimi (ABD doları) değeri değişimlerin kendine özgü riskleri öngörmedeki rolünü incelemektir.

Kendine özgü riskler gözlemlenemez olduğu için, literatürdeki tartışma konusu, bu risklerin nasıl ölçülebileceği üzerine olmuştur. Örneğin, üstel genelleştirilmiş otoregresif koşullu değişen (EGARCH) modeli kullanılarak, Fu (2009), beklenen getirileri öngörmede koşullu kendine özgü risk dalgalanmaların zamanla değişen karakteristiklerinin önemini vurgulamaktadır. Bu çalışmayı takip ederek, kendine özgü risklerin ana belirleyicilerini araştırmak amacıyla, portföy seviyesinde kendine özgü riskleri elde etmek için bu tezde EGARCH modelinden faydalandık. Ancak, bu model ileriye dönük önyargı problemine maruz kalabilmektedir (Fink ve ark., 2012; Guo ve ark., 2014). Hisse getirileri ve volatilitesi için ileriye dönük bilgi içeren bir değişkenin ihmal edilmesi koşullu volatilite modellerinin öngörülebilirliğini azaltabilir. Geleceğe yönelik önyargıyı dikkate almak için, başlıca finansal ve emtia piyasalarındaki belirsizlikleri göz önünde bulundurarak, öncelikle bu belirsizliklerin portföy getirilerinin koşullu volatilitesi hakkında ileriye dönük bilgi verip vermediklerini bu çalışmada test ettik. Bundan daha da önemlisi, biz aynı zamanda bu belirsizlik bilgisinin portföy düzeyindeki kendine özgü risklerin ana belirleyicilerinin etkilerinin önemini ve büyüklüğünü etkileyip etkilemediğini test ettik.

Kendine özgü risklerin belirleyicilerini araştırmak için, bu çalışmada otoregresif dağıtılmış gecikme (ARDL) yaklaşımından yararlandık. Bu yaklaşım, değişkenlerin (I (0) veya I (1)) entegrasyon derecesine bakılmaksızın değişkenler arasındaki dinamik etkileşimleri araştırmamızı ve dolayısıyla daha geçerli parametre tahminlerine ulaşmamızı sağlar. Daha da önemlisi, ARDL modeli seri korelasyon probleminden kaçınmamızı sağlar ve içsellik problemini azaltır. Tüm

bunlar dikkate alındığında, ARDL yaklaşımının daha güvenilir istatistiksel çıkarımlar yapmamızı sağlayacağını rahatlıkla söyleyebiliriz.

Bu çalışma, finansal aracıların piyasa likiditesini sağladıkları ve dolayısı ile küresel piyasalardaki çeşitli varlık fiyatlarını belirleyebildikleri iki mekanizma üzerine kurulmuştur. İlk olarak, hisse senedi piyasalarında spekülatör olarak hareket eden finansal aracıların karşı karşıya kaldığı finansman zorluklarının mevcudiyeti nedeni ile oluşan daha düşük piyasa likiditesini ve dolayısıyla menkul kıymet borsalarında yaratılan daha yüksek risk primini dikkate alıyoruz (bk. Brunnermeier ve Pedersen, 2009). Finansal aracıların oynadığı bu rolün, yüksek belirsizlik dönemlerinde artması beklenmektedir. Özellikle, daha riskli portföylere ilişkin kendine özgü risklerin, daha az riskli portföylere kıyasla bankalararası kredi piyasalarındaki fonlama likiditesi koşullarındaki dalgalanmalara karşı daha fazla hassasiyet gösterip göstermediğini araştırıyoruz. Ayrıca, bu duyarlılığın, kendine özgü riskler finansal piyasalar ve emtia piyasaları ile ilgili belirsizlikler hakkında bilgiler içerdiği zaman daha belirgin olup olmadığını inceliyoruz.

İkinci olarak, finansal olarak gelişmiş bir ülkedeki (bizim çalışmamızda ABD) finansal aracıların küresel finansal ortamındaki merkezi rolünü ele alıyoruz (bkz. Maggiori, 2017). Finansal olarak gelişmiş bir ülkedeki yatırımcılar, o ülkedeki finansal aracıların finansal kısıtlamaların üstesinden kolayca gelebilmeleri nedeniyle, özellikle de ekonominin iyi gittiği periyotlarda global piyasalarda riskli yatırımlar yapma eğilimindedirler. Ancak, küresel ekonomiye yönelik olumsuz bir şokun ardından, bu yüksek riskli pozisyonlar nedeniyle bu yatırımcılar için çok büyük kayıplar gözlemlenmektedir. Buna karşın, ABD dışındaki ülkelerdeki finansal aracılar daha riskli piyasa yapılarından dolayı olumsuz küresel ekonomik koşullara karşı dirençlerini artırmak için küresel ekonominin iyi olduğu zamanlarda ihtiyati tedbirler alırlar (örneğin, daha güvenli ABD doları borçları). Böylelikle kriz dönemlerinde, ABD'den yabancı ülkelere bir refah transferi gerçekleşir. Bu mekanizma, riskten korunma amaçlı olarak rezerv paranın (ABD doları) değerlenmesine yol açmaktadır. Bu nedenle, önemli

oranda ABD dolarının değer kazanmasının, kriz dönemlerinde hisse senedi piyasalarında artan kendine özgü risklere yol açan bankalararası piyasalarda (ve dolayısıyla piyasa likiditesinde) kötüleşen fonlama koşulları için bir gösterge olduğunu söyleyebiliriz. Önde gelen finansal ve emtia piyasalarındaki belirsizlik dikkate alındığında, ABD doları değerinin başlıca yabancı para birimleri karşısındaki dalgalanmalarının daha yüksek kendine özgü risklere sahip portföyler üzerinde düşük riskli portföylere kıyasla daha güçlü bir etki yapması beklenir. İlgili teorilere dayanan bu ekonomik mekanizmalar, test edilebilir hipotezlerin geliştirildiği ilerideki kısımlarda daha ayrıntılı olarak tartışılmıştır.

Özetle, konjönktür dalgalanmalarını kontrol ederek, bu çalışmada finansal aracıların risk taşıma kapasitesi ve hisse senedi piyasalarındaki portföylerin kendine özgü riski arasındaki ilişkinin dinamiklerini incelemeyi amaçladık. Temel bulgularımız, yüksek düzeyde kendine özgü risklere sahip olan portföylerin fonlama likidite koşullarının bozulmasına karşı daha savunmasız olduğunu göstermektedir. Bu kırılganlığın, ana finansal ve emtia piyasaları hakkındaki belirsizlik bilgilerinin kendine özgü risk ölçümlerine dahil edilmesiyle daha belirgin olduğu görülmüştür. Son olarak, rezerv para birimi (ABD doları) değerindeki bir artış, belirsizlik bilgisini içeren portföylerin kendine özgü risklerini önemli ölçüde artırmaktadır. Bu etki, özellikle yüksek riskli portföyler için daha güçlüdür. Ayrıca, bazı alternatif ekonometrik spesifikasyonları (örn. EGARCH tahminlerinde normal dağılım veya student-t dağılımı varsayımı ve ARDL modelindeki değişkenlerin gecikme sırasını seçmek için alternatif bilgi kriterleri) kullanarak sonuçlarımızın güvenilir olduğunu gösterdik. Genel olarak, çalışmamız, varlık piyasaları arasındaki temel ekonomik mekanizmaların belirlenmesinde finansal aracıların anahtar rolüne dair önemli bilgiler sunmaktadır.

Çalışmamızın özetinin geri kalanı şöyle devam etmektedir. 2. Bölümde, test edilebilir hipotezlerimiz literatürdeki teorik çalışmalara ve ampirik kanıtlara dayanarak geliştirilmiştir. 3. Bölümde, ampirik bulgularımızı sunuyoruz. Son

olarak 4. Bölümde, çalışmamızı sonuçlarımız ile ilgili temel tespitler ve gelecekteki araştırma önerileri ile sonlandırıyoruz.

2. Hipotez Geliştirme

Bu bölümde, ilgili literatürdeki teorik argümanlar ve ampirik gerçekler göz önüne alınarak, test edilebilir hipotezler geliştirilmiştir. Öncelikle, başlıca piyasalara ilişkin belirsizliğin neden kendine özgü risk hakkında ileriye dönük bilgileri içerebileceğini açıklıyoruz. Daha sonra, finansal aracıların risk taşıma kapasitelerindeki değişimlerin hisse senedi piyasalarında kendine özgü riskleri etkilediği iki yayılım kanalını ele alacağız. İlk mekanizma, fonlama likiditesi koşullarının ve kendine özgü risklerin nasıl ilişkilendirildiğini, ikincisinin ise başlıca finansal ve emtia piyasalarındaki belirsizliğin bu bağlantı üzerindeki etkisine işaret eder. Her iki iletim kanalında da finansal aracılar kilit rol oynamaktadır.

2.1 Belirsizlik ve Kendine Özgü Risk

Merton (1973) tarafından ortaya konulan Zamanlararası Sermaye Varlık Fiyatlandırma Modeline (ICAPM) göre, gelecekteki piyasa getirileri konusundaki artan belirsizlik, riskten korunma taleplerini ve ihtiyati tasarrufları artırmaktadır. Gelecekteki yatırım fırsatlarındaki olumsuz değişiklikler, gelecekteki nakit akışları (ve / veya beklenen piyasa getirileri) ile ilgili beklentileri değiştirerek, yatırımcıların ekonomik koşullardaki bir bozulmaya maruziyetini arttırmakta ve bunun sonucunda daha fazla riskten korunma talebi doğurmaktadır. Merton'un ICAPM'i (1973), riskli varlıkların taleplerini onların gelecekteki yatırım (ve / veya tüketim) fırsatlarına ilişkin belirsizliklere karşı korunma kabiliyetlerinin belirlediğini göstermektedir. Bu etkileri göz önünde bulundurarak, gelecekteki piyasa beklentilerindeki belirsizliğe bağlı olarak, yatırım fırsatlarında meydana gelen bozulmalara karşı riskten korunma arayışının beklenen kendine özgü riskler

ile ilgili bilgi içermesi kuvvetle muhtemeldir. Bu bağlamda, kendine özgü risklerin belirleyicilerinin başlıca piyasalardaki belirsizliğe dayalı açıklamaları, dikkatli ve ayrıntılı bir araştırmayı hak etmektedir.

Makroekonomik belirsizlik ve piyasa volatilitesi birbiriyle yakından ilişkili değişkenlerdir (Bloom, 2009; Schwert, 1989). Piyasa katılımcılarının volatilite riskinden korunmalarını zorlayan güçlü ekonomik belirsizlik genellikle kötüleşen ekonomik koşullar altında gözlenmektedir (Bloom, 2014). Teorik bir çerçevede, Xia (2001) belirsizlikten kaynaklanan riskten korunma taleplerinin, optimal bir portföyde varlık tahsisi kararlarını belirlemede büyük bir öneme sahip olduğuna işaret etmektedir. Bir başka teorik araştırmada, Bekaert ve ark. (2009) belirsizliğin ekonomik durgunluk ve gerileme dönemlerinde hatırı sayılır ölçüde arttığını göstermektedir. Ayrıca, getirilerin koşullu volatilitesindeki değişimin çoğunun belirsizlikteki varyasyona dayandığı sonucuna varmışlardır. Bu argümanlar dikkate alındığında, ekonomik durgunluklarla ilgili belirsizliğin optimal portföy yapılarını etkileyerek kendine özgü risklerin temel bir riskten korunma bileşeni olacağı beklenebilir.

Makroekonomik belirsizliklerin çeşitli kaynakları ekonomileri bir bütün olarak toplam üretimdeki, üretim maliyetindeki, yatırım ve istihdam oranlarındaki değişiklikler yoluyla etkilemektedir (Bernanke 1983; Bloom, 2009). Bernanke ve Kuttner (2005), vadeli işlem verilerini kullanarak, hisse senedi getirilerinin beklenmedik bir para politikası kararına güçlü bir şekilde tepkisini göstermişlerdir. Benzer bir çalışmada, Rigobon ve Sack (2004) para politikası haberlerini Eurodolar vadeli işlemlerinin ana belirleyicisi olarak dikkate almıştır ve Eurodollar cinsinden vadeli işlemlerden elde edilen faiz oranı (para politikası) sürprizlerinin hisse senedi piyasalarına etkisini bulmuşlardır. Emtia piyasalarının finansallaşması son zamanlarda daha fazla ilgi çekmiş ve önde gelen emtiaların (örn., petrol ve altın) hisse senedi getirisi ve volatilitesinin güçlü belirleyicileri haline gelmesini sağlamıştır. Petrol piyasalarındaki bilgi belirsizliği genel ekonomiyi (örn., üretim artışını, tüketimi ve yatırımı) etkilemektedir (Bakshi ve Chen, 1996; Elder ve Serletis, 2010). Borsadaki dalgalanmalara karşı altının

riskten korunmak için kullanılan güçlü bir enstrüman olmasından dolayı (Baur ve Lucey, 2010; Baur ve McDermott, 2010; Elder ve ark., 2012; Chan ve ark., 2011), altın piyasalarındaki belirsizlik enflasyonist baskılar ve dolayısıyla geleceğin para politikası kararları ile ilgili bilgi içermektedir. Tüm bunlar göz önüne alındığında, tahvil, döviz, petrol ve altın piyasalarındaki belirsizlik bilgisi riskli yatırımların davranışları üzerinde büyük önem taşıyabilir.

Bali ve Zhou (2016), yatırımcıların kendilerini yüksek volatilite gözlemlenen dönemlerde ana piyasalardaki olumsuz dalgalanmalardan koruma eğiliminde olduklarını ileri sürmektedir. Gelecekteki yatırım fırsatlarında meydana gelen olumsuz değişimlere bağlı olarak belirsizliklerin arttığı dönemlerde türev piyasalardaki riskten korunma faaliyetlerinde artış görülmektedir. Ayrıca, finansal aracılar, uzmanlık ve bilgi birikimlerinden yararlanarak türev piyasalarda bilgili ve profosyonel yatırımcılar olarak aktif rol oynamaktadır (He ve ark., 2017). Bu nedenle, finansal aracıların varlık piyasalarındaki karmaşık davranışlarını daha iyi anlamak için, türev piyasaların dinamiklerini dikkate almalıyız. Türev piyasalar arasında opsiyon piyasaları, beklenmedik fiyat dalgalanmalarına karşı başarılı bir şekilde riskten korunulabilen piyasalar oldukları için finansal aracılar açısından son derece önemlidir. Bu bağlamda, opsiyon piyasalarındaki dalgalanmalar, finansal aracıların varlık piyasalarında alacağı pozisyonlar hakkında önemli bir ileriye dönük bilgi sağlamaktadır. Riskten korunma çalışmaları ağırlıklı olarak üç ana risk sınıfına odaklanır: emtia, döviz ve faiz piyasaları (Allayannis ve Ofek, 2001; Allayannis ve Weston, 2001; Bartram, 2008; Campello ve diğerleri, 2011; Nelson ve diğerleri, 2005). Faulkender, 2005; Borokhovich ve ark. 2004, Jin ve Jorion, 2006; Tufano, 1996; Treanor ve ark., 2014). Bu risk sınıflarına dayanarak, bu piyasalardaki belirsizliği yansıtan başlıca finansal (döviz ve faiz) ve emtia (petrol ve altın) piyasalarındaki volatilite beklentilerinin, makroekonomik belirsizlik ve dolayısıyla kendine özgü riskler hakkında bilgi içerebileceğini savunuyoruz. Ayrıca, borsalardaki hisse senetlerinin opsiyona bağlı hisse senedi piyasası oynaklığına önemli ölçüde maruz kalması sermaye piyasalarında büyük bir

öneme sahiptir (Ang ve diğerleri, 2006). Chicago Board Options Exchange (CBOE) Volatilite Endeksi (VIX), mevcut literatürde belirsizliği temsil etmesi için yaygın olarak kullanılmaktadır (örn. Bloom, 2014; Leduc ve Liu, 2016). Bu bilgiler ışığında, hisse senedi, hazine bonosu, döviz, petrol ve altın fiyatlarının opsiyon piyasalarından kaynaklanan volatilite beklentilerinin başlıca piyasalardaki belirsizliğin temsilcileri olarak dikkate alarak ana piyasalardaki bilgi belirsizliğinin etkilerini daha iyi gözlemlemeyi amaçladık.

2.2 Fonlama Likiditesi ve Kendine Özgü Risk

Çeşitli çalışmalar piyasa işlem hacmi (likidite riski için bir temsilci) ve volatilite arasındaki korelasyonları gösterir iken (Karpoff, 1987; Schwert 1989; Lamoureux ve Lastrapes, 1990) diğer bazı çalışmalar piyasa likiditesini varlık fiyatlarıyla ilişkilendirmişlerdir (Amihud ve Mendelson, 1986; Constantinides, 1986; Heaton ve Lucas, 1996; Huang, 2002). Sezgisel olarak, yatırımcıların likit olmayan piyasalardan kaynaklanan risk primine maruz kaldıkları soylenebilir. Bu nedenle, yatırımcıların likit olmayan piyasalarda hızlı bir şekilde işlem yapamayacaklarından dolayı alım satım maliyetini telafi etmek için daha düşük fiyattan işlem yapma talebinde bulunduklarını söyleyebiliriz. Likit olmayan varlıkların mevcudiyeti, özellikle eşit ağırlıklı portföyler için, portföy seviyesindeki kendine özgü riskleri güçlü bir şekilde arttırabilir (Bali et al., 2005).

Fonlama likiditesi koşullarının kendine özgü risk üzerindeki etkisi literatürde daha önce ilgi görmemiş ve bildiğimiz kadarı ile ampirik testler kullanılarak incelenmemiştir. Finansal aracılar, birçok piyasanın volatilitesini aynı anda etkileyen aktif piyasa oyuncularıdır. Global piyasalardaki faaliyetlerini finanse etmek için hem kendi sermayelerini hem de diğer finansörlerden borçlanarak elde edilen kaynakları kullanırlar (Brunnermeier ve Pedersen, 2009). Bu nedenle, finansal aracıların finanman kısıtları onların global piyasalardaki işlemlerini ve dolayısıyla varlık fiyatlarını etkilemede merkezi bir öneme sahiptir.

Brunnermeier ve Pedersen (2009) fonlama likidite koşulları ile varlıkların piyasadaki likiditesi arasındaki ilişkiyi inceleyen teorik bir model oluşturmuşlardır. Bu modele göre, piyasa likiditesinin fonlama likidite koşullarından kaynaklanması durumunda, piyasa dalgalanmalarından kaynaklı etkiler kendine özgü volatilite üzerinde doğrudan görülebilir. Borsada spekülatör olarak hareket eden finansal aracılar için finansman kısıtlamalarının varlığının, piyasa likiditesinin azalmasına yol açtığı ve dolayısıyla daha yüksek kendine özgü risk primi yarattığı söylenebilir. Bu süreç likit olmayan piyasaların (ve dolayısıyla kendine özgü risk primindeki artışların) esas olarak spekülatörlerin fon elde etme zorluklarından kaynaklandığını göstermektedir. Spekülatörlerin marjları sadece varlıkların temel karakteristiklerinden kaynaklanan volatiliteye değil, aynı zamanda bilgisiz finansörlerin varlığında likidite bazlı volatiliteye de dayanmaktadır. Bilgi sahibi olmayan finansörler, piyasadaki likidite azlığından kaynaklanan fiyat oynaklığını temel karakteristiklerinden kaynaklanan volatilite olarak değerlendirebilirler ve bu durum daha yüksek marjlara yol açar.

Yüksek bir belirsizlik seviyesi yatırımcıların sınırlı derecede piyasada işlem yapmalarına neden olmaktadır (Cao ve diğerleri, 2005). Düşük piyasa katılımı, piyasa oyuncuları tarafından riskten korunma ihtiyacı yaratan piyasadaki likiditenin azalması nedeniyle risk priminde artışa neden olmaktadır. Mele (2007) ekonomik gerileme periyotlarında yüksek seviyede volatilitiye yol açan artan belirsizliğinin yol açtığı bu risk primini belgelemiştir. Finansal aracıların sermayesi ve piyasadaki belirsizlikler hisse senedi piyasalarını aynı anda etkileyen birbiriyle ilişkili faktörlerdir (Brunnermeier ve Pedersen, 2009). Başlıca piyasalardaki belirsizliğin varlığında, finansal aracıların finansman kısıtlamalarının artması, istikrarsızlaştırıcı marjların daha yüksek olması nedeniyle piyasadaki likiditeyi önemli ölçüde azaltmaktadır (Brunnermeier ve Pedersen, 2009). Bu nedenle, belirsiz bir ekonomik ortamda kötüleşen finansman koşullarından kaynaklanan kendine özgü riskler, sakin dönemlere kıyasla daha fazla artmaktadır. Bu iddiaların ışığında, bu çalışmada, fonlama likiditesi koşullarına yönelik olumsuz şokların azalan piyasa likiditesi yoluyla kendine

özgü risklerde dalgalanmalara yol açacağını savunuyoruz. Ayrıca, artan ekonomik belirsizlik ortamının yarattığı finansal aracıların risk taşıma kapasitesinde ciddi azalmalar nedeniyle bu dalgalanmaların daha güçlü olacağı öngörülebilir. Bu ekonomik mekanizmalar daha yüksek volatiliteye sahip olan portföylerin kendine özgü risklerini düşük volatiliteye sahip olan portföylerinkine göre daha kuvvetli bir şekilde etkilemektedir. Bunun temel nedeni yüksek volatiliteye sahip olan (likit olmayan) varlıkların temel değerinin belirlenmesindeki zorluk bu varlıklar için daha yüksek marj taleplerine neden olmaktadır (Brunnermeier ve Pedersen, 2009). Yukarıdaki argümanları dikkate alarak, aşağıdaki test edilebilir hipotezler önerilmektedir;

Hipotez 1a. Bankalararası kredi piyasalarındaki fonlama koşullarındaki bozulma portföylerin kendine özgü riskini önemli ölçüde artırmaktadır.

Hipotez 1b. Bu artış yüksek riskli portföyler için daha güçlüdür.

Hipotez 1c. Bu artışın etkisi ekonomik belirsizliğin varlığında artar.

2.3 Rezerv Para Birimi (ABD Doları)ve Kendine Özgü Risk

ABD doları, başlıca fonlama kaynağı ve rezerv para birimi olduğu için uluslararası piyasalarda önemli bir rol oynamaktadır. Global yatırımcıların portföy yapıları, bu ana fonlama kaynağının göreceli gücünden etkilenmektedir (Adrian ve diğerleri, 2015). Finansal aracıların (hem ABD hem de ABD dışındaki aracılar) global piyasalardaki işlemleri dolar yükümlülüklerinin miktarına bağlıdır. Finansal aracıların sınırlı risk taşıma kapasitesi göz önünde bulundurulduğunda, küresel ekonomik koşullardaki önemli değişikliklerin onların operasyonları üzerinde güçlü bir etkisi vardır ve bu etki ABD doları değerinde dalgalanmalara yol açmaktadır.

Gabaix ve Maggiori (2015), döviz kurlarındaki dalgalanmaların tespiti ile ilgili teorik bir incelemede, finansörlerin bilançolarındaki değişikliklerin küresel varlık piyasaları arasındaki sermaye akışlarını değiştirdiğini ve bunun da döviz kurlarını etkilediğini savunmaktadır. Onların modellerinde, dış ticaret dengesi,

enflasyon ve üretimden ziyade, finansal aracıların risk taşıma kapasitesinin küresel varlık piyasalarındaki talep ve arz koşullarına bağlı olarak döviz kuru dalgalanmalarını belirleyen temel unsur olduğu iddia edilmiştir. Bu açıdan, finansal aracıların döviz kuru dinamiklerini belirleyen ekonomik faaliyetlerin merkezinde yer aldığı söylenebilir. Yabancı para birimleri, küresel piyasalarda ABD dolarına göre negatif bir şoka daha duyarlıdır. Dolayısıyla, küresel bir finansal kriz yabancı finansal aracıların risk taşıma kapasitesini ciddi ölçüde azaltmaktadır (Gabaix ve Maggiori, 2015). ABD finansal aracıları kriz zamanlarında kısa dolar pozisyonları alma eğiliminde değiller ve dolayısıyla böyle dönemlerde dünyanın geri kalanına dolar tahvilleri sağlamazlar. Bu nedenle, yabancı finansal aracıların, küresel ekonomik koşullardaki ani olumsuz değişimlere karşı, global ekonominin iyi gittiği zamanlarda makro ihtiyati tedbirler (örneğin, daha güvenli ABD doları borçları) almaları gerekmektedir. Bu açıklanan ekonomik mekanizmalar ile finansal aracıların risk taşıma kapasitelerindeki değişimlerden kaynaklanan döviz kuru dalgalanmaları tüm piyasalarda varlık fiyatlarını etkilemektedir.

Bizim ikinci hipotezimiz Maggiori'nin (2017) kuramsal iddialarına dayanmaktadır. Bu teorik incelemede, ABD finansal aracılarının rezerv para birimi (ABD doları) değerini belirlemedeki kilit önemine dikkat çekilmektedir. ABD finansal aracıları daha güvenli ABD doları yükümlülüklerinden ziyade, ekonomik büyüme periyotlarında yabancı para cinsinden riskli varlıklara yatırım yapma eğilimindedir. Bu durum, onların yabancı finansal aracılara kıyasla finansman sorunlarının üstesinden daha kolay bir şekilde gelebilmesinden kaynaklanmaktadır. Bununla birlikte, ABD küresel piyasalarda riskli yatırımlardan kaynaklanan artan bir finansal gelir ile birlikte daha fazla tüketim eğilimine girmektedir. Bu eğilim aynı zamanda ABD ticaret açığını da arttırmaktadır (Maggiori, 2017). Bu ekonomik mekanizma, ABD finansal aracılarını kriz dönemlerinde küresel ekonomideki negatif şoklara karşı daha savunmasız hale getirmektedir. Öte yandan, yabancı finansal aracılar, iyi ya da kötü ekonomik dönemler olup olmadığına bakılmaksızın finansman sorunlarından

daha fazla endişe duymaktadır. Yabancı ülkeler genellikle spekülatif sermaye girişleri alır ve bunun sonucu olarak riskli para birimleri vardır. Dolayısıyla, yabancı finansal aracıların bilançosu, küresel ekonomiye yönelik olumsuz şoklara karşı ihtiyadi tedbirler aldıkları için daha fazla ABD Doları (daha güvenli) yükümlülüklerinden oluşmaktadır. Bu açıdan bakıldığında, finansal aracılar arasındaki asimetrik risk paylaşımı küresel finansal istikrarsızlığı şiddetlendirmekte ve kriz dönemlerinde ABD'den yabancı ülkelere servet transferine yol açmaktadır. Bu mekanizma finansal riskten korunma nedenlerinden dolayı ABD dolarındaki değer artışlarına neden olmaktadır. Bu değer artışları bize bankalararası piyasalarda fonlama likidite koşullarının kötüleştiğini ve dolayısıyla da yüksek belirsizlik dönemlerinde piyasa likiditesinin azaldığını ve risk primlerinin arttığını gösterir.

Ekonomik gerileme periyotlarında, riskli yatırımlardaki anormal kayıplar finansal aracıların sermayesini zayıflatır (özellikle dış portföy yapısındaki daha büyük riskler nedeniyle ABD finansal aracıları için). Bu dönemlerde, finansal aracılar daha yüksek kayıpları önlemek için varlık ve sermaye piyasalarındaki riskli yatırımlara yatırım yapmaktan kaçınırlar. Dolayısıyla, küresel ekonomiye yönelik büyük bir olumsuz şokla birlikte, hem ABD hem de yabancı finansal aracılar, ABD finansal aracıları tarafından çoğunlukla finanse edilen bankalararası piyasalarda (bankalararası mevduatlar) daha güvenli varlıklar aramaya başlar ve özellikle borsalardaki riskli pozisyonlarını kapatmaya çalışırlar. Ancak, yabancı aracılara kıyasla, ABD'li aracılar ekonominin iyi dönemlerinde daha fazla risk aldıkları için, küresel piyasalardaki yüksek riskli pozisyonları nedeniyle yüksek volatilite periyotları boyunca yabancı aracılara dolar fonları sağlama konusunda motive değildir (Maggiori, 2017). Finansal aracıların ekonominin kötü dönemlerinde risk taşıma kapasitelerindeki bu değişimler göz önünde bulundurulduğunda, ABD finansal aracılarının risk iştahındaki bir azalma, yüksek bilgi belirsizliğinin varlığında bankalar arası kredi piyasalarındaki fonlama likidite kanallarını bozarak, finansal istikrarsızlığın artmasına yol açmaktadır (örn., borsalardaki düşük işlem hacmi gibi). Bu

nedenle, finansal aracıların sermayelerindeki ekstra herbir dolar ekonomik durgunluk ve gerileme dönemlerinde aracılar açısından ekonomik büyüme dönemlerinden daha değerli olarak algılanmaktadır (He ve ark., 2017).

Bu ekonomik yayılım kanallarına dayanarak, kriz dönemlerinde ABD dolarının dikkate değer biçimde değer kazanması, bankalararası piyasalardaki fonlama likidite koşullarının önemli ölçüde bozulmasına işaret etmektedir. Bu nedenle, bu ciddi artışın özellikle belirsizliğin hakim olduğu bir ekonomik ortamda piyasa likiditesini azaltması ve risk primini güçlü bir şekilde arttırması beklenir. Bu etkilerin, öncelikle riskli pozisyonların kapatılması eğilimi nedeni ile, yüksek riskli portföylerde daha fazla gözlenmesi kuvvetle muhtemeldir. Bu iddialara dayanarak aşağıdaki hipotezler önerilmiştir;

Hipotez 2a. Rezerv para birimi (ABD doları) değerindeki bir artış piyasalardaki belirsizlik bilgilerini içeren kendine özgü riski önemli ölçüde arttırmaktadır.

Hipotez 2b. Bu artış yüksek riskli portföyler için şiddetlenmektedir.

3. Ampirik Bulgular

Modelimizden elde edilen kendine özgü risk tahmin sonuçlarına göre, beklendiği gibi, eşit ağırlıklı portföyler düşük işlem hacmi ve dolayısıyla alım-satım fiyatları arasında oluşan anormallikler gibi piyasadaki bazı mikro-yapı problemlerinden dolayı değer ağırlıklı portföylerden daha risklidir. Bunun nedeni, küçük firma hisselerinin eşit ağırlıklı portföylerde, değer ağırlıklı portföylere kıyasla, daha fazla olmalarından kaynaklanmaktadır. Portföylerin riskleri, yetersiz bilgi, daha yüksek iş riski ve daha yüksek sermaye maliyeti nedeniyle portföydeki küçük şirketlerin ağırlığındaki artışla birlikte artmaktadır. Bu da, eşit ağırlıklı portföylerin volatilitesini konjönktürel koşullara daha hassas hale getirmektedir. Ayrıca, beklendiği gibi, en riskli portföy küçük ve hızlı büyüme eğilimi gösteren şirketlerin oluşturduğu eşit ağırlıklı portföydür. Bu sonucun arkasındaki temel neden, bu firmaların diğer akranlarından ve büyük firmalardan

daha yüksek büyüme fırsatlarına sahip olmalarına rağmen, üretim yapma ve yöntem bilgisi eksikliği, finansman zorlukları, belirsiz uzun vadeli beklentiler ve düşük marka bilinirliği gibi bazı dezavantajlar nedeniyle daha riskli ekonomik çevreye maruz kalmalarıdır. Büyük ve güçlü karakteristiklere sahip olan şirketlerden oluşan portföylerin büyük ve hızlı büyüme eğiliminde olan şirketlerden oluşan portföylere göre daha riskli olduğu görülmektedir. Büyük ölçekli ve güçlü karakteristiklere sahip olan firmaların kazançları konjöktürel dalgalanmalara önemli ölçüde bağımlıdır ve bu durum onları nakit akış risklerine daha açık hale getirir. Bu nedenle, bu şirketler, büyük ve hızlı büyüme eğiliminde (operasyonel faaliyetlerinde daha güçlü) olan şirketlere kıyasla ekonomik durgunluklar ve gerilemeler sırasında dışsal şoklara karşı daha savunmasızdır.

Temel bulgularımız, hisse senedi, tahvil, döviz, petrol ve altın piyasalarındaki belirsizlik bilgisinin koşullu varyanslara önemli etkileri olduğunu göstermektedir. Tahmin edilen EGARCH modelleri, varyans denkleminde belirsizlik bilgileri dikkate alındığında, bu bilgiyi dikkate almayan EGARCH modellerinden daha yüksek log-olabilirlik değerlerine ve daha düşük Akaike bilgi kriterlerine (AIC) sahiptir. Bu sonuçlar, başlıca piyasalardaki belirsizliğin koşullu varyans tahminlerinin doğruluğunu arttırdığını ve böylece ileriye dönük önyargıyı (look-ahead bias) azalttığını göstermektedir.

Varyans denklemindeki ana piyasalar hakkındaki belirsizlik bilgisinin rolüne gelince, bazı bulgularımıza değinmek gerekmektedir. Sonuçlarımız, başlıca finansal ve emtia piyasalarındaki bilgi belirsizliğinin kendine özgü risklerin önemli bir kaynağı olduğunu göstermektedir. Tahmin sonuçlarının portföylerin temel karakteristiklerine bağlı olduğu görülmektedir. Hisse senedi piyasası belirsizliği (VIX) küçük ve büyük ölçekli ve büyüme eğiliminde olan firmaların hisselerinden oluşan eşit ağırlıklı portföylerin kendine özgü riskleri üzerinde daha fazla güçlüdür. Bu sonuç bu firmalarının bazı temel özelliklerinden kaynaklanabilir. Temettü ödemenin aksine, elde edilen kazançları potansiyel olarak karlı yatırımlara dönüştürmek bu firmalar arasında yaygın olarak görülen bir eğilimdir. Bu eğilim hisse senedi fiyatlarında önemli artışlar sağlar.

Dolayısıyla, yatırımcılar, temettülerden ziyade, kazançlarını bu firmaların hisse senedi fiyat değerlemeleri (sermaye kazancı) yoluyla elde edilir. Düşük temettü ödeme eğilimi (daha az güvenilir gelir), yatırımcıların dalgalı bir finansal ortamda gelecekteki hisse senedi fiyatı belirsizliğinden (VIX) kaynaklanan bu hisselerin fiyat risklerinden korunmalarına neden olmaktadır. Bu eğilim bu firmaların hisselerinin getirilerinde artan oynaklıklara (volatiliteye) neden olabilir.

Buna ek olarak, para politikası belirsizliği ve enflasyonist baskılarla ilgili bilgi veren altın ve tahvil piyasalarındaki belirsizlik bilgilerinin, diğer portföylere kıyasla, büyük ve güçlü karakteristiklere sahip firmaların hisselerinden oluşan portföylerin kendine özgü riskleri hakkında daha fazla bilgi içeriğine sahip olduğunu gözlemledik. Bu firmaların hisseleri, sağlıklı ve kuvvetli temellere dayanan yüksek temettü beklentileri nedeniyle nakit akış riskinden önemli ölçüde etkilenmektedir. Nakit akış riskinin yüksek olması nedeniyle, durgunluk ve gerileme periyotlarında bu hisselere yatırım stratejileri çok riskidir (Campbell ve Vuolteenaho, 2004; Campbell ve ark., 2009). Örneğin, para politikası belirsizliği gibi makroekonomik haberler, büyük ve güçlü karakteristiklere sahip şirketlerinin temel riskleri üzerindeki olumsuz etkileri nedeniyle enflasyonist bir ortamda nakit akış riskinin artmasına yol açabilir. Bu nedenle, ekonominin zor dönemlerinde, yatırımcıların bir dizi makroekonomik habere aşırı tepki vermesi bu şirketlerin hisse senedi getirilerinde artan dalgalanmalara neden olmaktadır.

Eş-bütünleşme testi sonuçlarımız portföy seviyesindeki kendine özgü riskler ve diğer makroekonomik değişkenler arasında önemli derecede eş-bütünlüşmenin olduğunu göstermektedir.

Konjöktür dalgalanmalarını işaret eden değişkenlere (örn., iflas riski, ABD hazine tahvillerinin vade açıklığı, federal fon oranları) kıyasla, bankalararası piyasalarda fonlama likidite koşulları (TED) ve ABD doları değerindeki değişimler, özellikle başlıca piyasalardaki belirsizlikler dikkate alındığında tüm portföylerin kendine özgü riskleri üzerinde daha güçlü etkilere sahiptir. İlk hipotezlerimizde beklendiği gibi, bulgularımız, portföy getirilerinin koşullu varyansı üzerindeki belirsizlik bilgisinin bankalararası piyasalardaki

fonlama likiditesi koşullarının portföy seviyesindeki riskler üzerindeki arttırıcı etkisinde önemli bir itici güç olduğunu göstermektedir. Sonuçlara göre, yüksek riskli ve eşit ağırlıklı portföylerin kendine özgü riskleri, daha az riskli ve değer ağırlıklı portföylerin kendine özgü risklerine kıyasla, fonlamadaki likidite koşullarındaki bozulmadan beklendiği gibi daha fazla etkilenmektedir. Eşit ağırlıklı portföylere en az likit, en düşük fiyatlı ve en küçük şirketlerin hisselerinin dahil edilmesi, fonlama likidite koşullarının kendine özgü riskler üzerindeki etkisinin büyüklüğünü ve önemini arttırmaktadır. Ayrıca, bu etki kendine özgü riskler finansal ve emtia piyasalarındaki belirsizlik bilgisini içerdiğinde daha da şiddetlenmektedir. Bu sonuçlar, Brunnermeier ve Pedersen'in (2009) çalışması ile tutarlı olarak, özellikle belirsizliğin hakim olduğu bir ekonomik ortamda piyasadaki likidite üzerindeki olumsuz etkilerle, bankalar arası piyasalardaki fonlama likiditesi koşullarının bozulmasının kendine özgü riskler üzerindeki itici gücünün önemini göstermektedir.

Belirsizlik hakkında bilgi içermeyen portföy seviyesindeki kendine özgü risklerin rezerv para birimindeki (ABD doları) dalgalanmalardan etkilenmediğini gözlemledik. Fakat, ABD doları değerindeki artışlar başlıca piyasalar hakkında belirsizlik bilgisi içeren portföy seviyesindeki kendine özgü riskleri dikkate değer ve önemli derecede arttırmaktadır. Bu artış daha riskli portföyler için daha da güçlüdür. Sonuçlar geliştirdiğimiz hipotezlerimizi doğrular. Kötüleşen küresel bir finansal ortamda, ABD dolarının değer kazanması bankalararası piyasalarda finansal istikrarsızlığa işaret etmektedir (Maggiori, 2017). Bu nedenle, ABD dolarındaki değer kazancı, ABD Doları'nın riskten korunma amaçlı kullanımı nedeniyle borsadaki likiditenin ve dolayısıyla finansal aracıların riskli varlıklara yatırım yapma eğiliminin azalmasına neden olabilir. Sonuç olarak, ekonominin kötü gittiği dönemlerde, finansal aracıların risk taşıma kapasitelerindeki ciddi azalmalar yüksek riskli ve likit olmayan varlıklardan oluşan portföylerin kendine özgü risklerini önemli ölçüde arttırmaktadır. Özetle, bizim bulgularımız, rezerv para birimindeki (ABD doları) değer artışlarının, başlıca finansal ve emtia piyasalarındaki bilgi belirsizliği göz önüne alındığı zaman, yüksek riskli ve likit

olmayan portföylerin kendine özgü riskini güçlü biçimde şiddetlendirdiğini göstermektedir. Bunun nedeni, ABD dolarının kriz dönemlerinde piyasadaki likiditenin azalmasına yol açan fonlama likidite koşullarındaki bozulmaya karşı önemli bir riskten korunma enstrümanı olarak ön plana çıkmasıdır.

Daha spesifik olarak, ABD dolarındaki değer artışlarının etkisi, belirsizlikle ilgili bilgiler dikkate alındığında, büyük ve güçlü karakteristiklere sahip olan şirketlerin hisselerinden oluşan eşit ağırlıklı portföylerin kendine özgü riskleri üzerinde daha belirgindir. Genelde, yatırımcılar tarafından bu firmalarının yüksek miktarda temettü ödemesi beklenir. Bu firmaların hisse senedi getirilerinin oynaklığı temettü haberlerinin oynaklığı ile doğru orantılı olabilir (Campbell ve Hentschel, 1992). Bu mekanizma yatırımcıların bu firmaların temettü ödemeleri ile ilgili ekonomik belirsizlikten daha fazla endişe duymasına neden olur. Gelecekteki temettüler hakkındaki belirsizlik, bireysel varlıklar ve piyasa portföyü için bir risk primi yaratmaktadır (Buraschi ve diğ., 2014). Tüm bunlar göz önünde bulundurulduğunda, ABD doları değer kazanımlarının önemli etkisinin nedeni, yüksek değerli, büyük ve güçlü karakteristiklere sahip olan şirketlerin hisselerinden oluşan eşit ağırlıklı portföylerin kendine özgü riskinin yüksek miktarda para politikası belirsizlik bilgisine sahip olması ve bu bilginin gelecekteki temettülerle ilgili ciddi belirsizlikler yaratabilmesi olabilir.

Önceki bölümlerde de belirtildiği gibi, ARDL modelindeki değişkenlerin gecikme süresini belirlemek için Pesaran ve Pesaran (1997) tarafından önerilen Schwartz Bayesian bilgi kriterini (SBC) seçtik. Bulgularımzın doğruluğunu teyit edebilmek için, AIC'yi (Akaike bilgi kriteri) kullanarak analizlerimizi tekrarladık. Farklı gecikme sürelerini kullanarak elde edilen sonuçlar, bu çalışmada sunduğumuzdan farklı değildir.

Koşullu dağılım varsayımı değiştirilirse, kendine özgü risk tahminlerinin (Baillie ve DeGennaro, 1990) ve bu nedenle bu risklerin uzun vadeli belirleyicilerinin değişebileceği tartışma konusu olabilir. Hisse senedi getirileri genelde şişman kuyruklu dağılım yapısı gösterirler. Bu nedenle, bu durumu dikkate alarak EGARCH modellerini geliştirdik ve kendine özgü riskleri tahmin

etmek için Student's t-dağılımını kullandık. Belirsizlik bilgisinin portföy getirilerinin koşullu varyansı üzerinde benzer etkilerini gözlemledik. Student t-dağılımına dayanan yeni kendine özgü riskleri elde ettikten sonra, bu yeni risklerin uzun vadeli belirleyicilerini elde etmek için ARDL modellerinden tekrar faydalandık. Bu testler AIC ve SBC bilgi kriterleri kullanılarak yapılmıştır. Tüm bu testler sonucunda oldukça benzer sonuçlara ulaştık.

4. Sonuç

Finansal aracılar piyasa likiditesinin sağlanmasında ve dolayısıyla varlık piyasaları arasındaki dinamik ilişkileri etkilemede önemli bir rol oynamaktadır. Finansal aracıların yüksek volatiliteye sahip (likit olmayan) hisse senetlerini almaları ve / veya satmaları yönündeki eğilimi, ellerinde bulundurdukları büyük portföyler nedeniyle borsalardaki arz-talep mekanizmasını güçlü bir şekilde etkilemektedir. Bu eğilim değişen küresel ekonomik koşullara bağlı olarak farklılaşır. Bu nedenle, riskli varlıklar ve portföyler, başlıca piyasalarla ilgili belirsizlik bilgisine bağlı olarak, finansal aracıların varlık tahsis kararlarından ve risk yönetim stratejilerindeki değişikliklerinden hızlı ve güçlü bir şekilde etkilenebilir. Bu bağlamda, finansal aracıların sınırlı risk taşıma kapasitesi küresel piyasa dinamiklerini etkileme açısından kilit öneme sahiptir. Bu çalışmada, finansal aracıların küresel varlık piyasalarındaki bu merkezi rolünü dikkate alarak, finansal aracıların risk taşıma kapasitelerindeki değişimlerin portföylerin kendine özgü riskleri üzerinde hangi ekonomik mekanizmalar aracılığıyla etkisi olup olmadığını araştırıyoruz. Bu kapsamda, başlıca finansal ve emtia piyasalarındaki belirsizliklerin bu mekanizmalarda oynadığı rolü dikkate aldık. Bu çalışmada belirtilen ekonomik mekanizmalar, literatürdeki ekonomik teoriler temelinde tanımlanmıştır.

Bizim sonuçlarımıza göre, finansal aracıların risk taşıma kapasitesi düzeyindeki kötüleşme, değişen ve dinamik bir ekonomik ortamda kendine özgü risklerde ciddi artışa neden olmaktadır. Bu artış, volatilitesi yüksek portföylerin

(örneğin, eşit ağırlıklı portföylerin) kendine özgü riskleri için daha belirgindir. Daha da önemlisi, başlıca finansal ve emtia piyasalarındaki bilgi belirsizliğinin, finansal aracıların risk taşıma kapasitelerindeki değişimlerin kendine özgü riskleri daha fazla etkilemesine neden olarak, kendine özgü risklerin temel kaynağı olduğunu gözlemledik. Bu çerçevede, bankalar arası piyasalardaki bozulan fonlama likidite koşullarının, finansal aracılar başlıca piyasalardaki belirsizlik artışı ve global piyasalardaki olumsuz dalgalanmalar nedeniyle kötüleşen yatırım fırsatları arasında bir ilişkilendirme yaptığı zaman kendine özgü riskleri daha güçlü bir şekilde arttırdığı görülmektedir.

Sonuçlarımız, finansal aracıların artan finansman sıkıntılarının belirsiz bir ekonomik ortamda artan finansal sürtüşmelere (örneğin bilgi kaybı, bilgi asimetrisi) bağlı olarak etkin olmayan piyasalara neden olduğuna işaret etmektedir. Başlıca piyasalardaki belirsizlik bilgi riskini, likidite riskini ve dolayısıyla işlem maliyetlerini (bunlar spekülatörlerin sermayesinin gölge maliyeti gibi düşünülebilir (Brunnnermeier ve Pedersen, 2009)) daha fazla likit olmayan hisse senedi piyasalarına ve daha güçlü bir şekilde riskten korunma saiklerine yol açacak şekilde arttırmaktadır. Bu mekanizmanın bir sonucu olarak, özellikle daha fazla bilgi riskine sahip olan, likit olmayan ve volatilitesi yüksek varlıklar ve portföyler, belirsiz bir ortamda bankalararası kredi piyasalarına yönelik olumsuz bir şoktan daha güçlü bir biçimde etkilenmektedir. Özetle, bu çalışmada, bankalar arası kredi piyasalarındaki bozulmakta olan fonlama koşullarının piyasalardaki belirsizlik aracılığı ile kendine özgü riskler üzerindeki etkilerinin belirlenmesinde finansal riskten korunma taleplerinin rolüne dair ciddi kanıtlar ortaya konmuştur.

Kendine özgü risklerin yol açtığı risk priminin büyüklüğünü ve zamanlamasını yakalamak, yatırımcılar bu riske maruz kalmamak için riskten korunma fırsatları aradıklarından, varlık portföy yapılarını belirleme açısından merkezi bir öneme sahiptir. Bir ekonomik mekanizmanın volatilitesi yüksek portföylerin davranışını nasıl değiştireceğine dair titiz bir araştırma doğru riskten korunma stratejilerinin geliştirilmesinde çok önemlidir. Bu nedenle, bir portföyde

riskli hisse senetlerinin (örneğin küçük firmaların hisse senetleri) uygun şekilde nasıl tahsis edilmesi gerektiğinin belirlenmesi, yatırımcıları makroekonomik dalgalanmaları dikkatle takip etmeye zorlamaktadır. Riskli bir finansal ortam volatilitesi yüksek hisse senetlerinin değerini belirlemek ve dolayısıyla uygun yatırım stratejilerini belirlemek için oldukça zor koşullara neden olmaktadır. Sonuçlarımız, bankalararası piyasalarda fonlama likiditesi koşullarında yaşanan bozulmanın yol açtığı artan kendine özgü riskler ile birlikte, özellikle belirsiz ekonomik koşullar altında piyasa likiditesinin azaltılması yoluyla iyi çeşitlendirilmiş portföylerin oluşturulmasını engellediğine işaret etmektedir. Bu bulgu, finansal aracıların risk taşıma kapasitelerindeki konjönktürel değişimler nedeniyle değişen ekonomik yayılım kanallarının ve bunların kendine özgü riskler üzerindeki etkilerinin anlaşılmasının, piyasa oyuncularının daha gelişmiş finansal riskten korunma ve doğru yatırım stratejileri belirlemesine olanak sağlayacağını vurgular. Finansal aracıların ekonomik belirsizliğin yüksek olduğu dönemlerde finansal istikrarsızlığı arttırıcı rolünün göz ardı edilmesi uygun varlık tahsis stratejilerini ve iyi çeşitlendirilimiş portföylerin oluşmasını engeller.

Bulgularımız, Brunnermeier ve Pedersen (2009) ve Maggiori (2017) 'nin teorik öngürülerine ampirik bir destek sunmaktadır. Ancak, makroekonomik dalgalanmalardan etkilenen finansal aracıların risk taşıma kapasitesi ve kendine özgü riskler arasındaki aktarım kanallarını daha iyi anlamak için detaylı belirsizlik bilgisini dikkate alan daha kapsamlı bir teorik çerçeveye ihtiyaç vardır. Çalışmamız, diğer gelişmiş ve gelişmekte olan piyasalara odaklanmak için uluslararası verileri kullanarak genişletilebilir. Ayrıca, büyüklük ve değer stratejilerinden ziyade, diğer yatırım stratejilerine (ör. büyüklük ve karlılık stratejileri) dayalı olarak oluşan portföylerin kendine özgü riskleri gelecekteki çalışmalarda incelenebilir. Son olarak, gelecekteki araştırmalar, bu çalışmada incelenen borç kısıtları yerine, finansal aracıların sermaye kısıtlarının rolünü belirlemeye odaklanabilir.

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