Shunned Stocks and Market States

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Version: October 2021

Abstract

Hong and Kacperczyk (2009, The price of sin: The effects of social norms on markets. Journal of Financial Economics 93(1), 15–36) document that "sin stocks" (alcohol, tobacco, and gambling) earn relatively high returns on a risk-adjusted basis. We revisit their original study with an updated sample. Contrary to the stylized facts that prominent anomalies attenuate out-of-sample or in the post-publication period (McLean and Pontiff, 2016, Does academic research destroy stock return predictability? The Journal of Finance 71, 5-32), we document that the superior performance of sin stocks has persisted over the most recent decade (2009–2018). This is consistent with the increased popularity of socially responsible investing over recent decades, pushing more norm-constrained investors away from sin stocks. Further analyses suggest that sin stocks outperform in low-liquidity states and in high-uncertainty states and are recession-proof. Overall, our work supports the shunned stock hypothesis and indicates the price of sin stocks is alive and well.

Keywords: Sin stocks; Social norms; Shunned stock hypothesis; Market states

JEL classification: G11; D71

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Abstract

Hong and Kacperczyk (2009, The price of sin: The effects of social norms on markets. Journal of Financial Economics 93(1), 15–36) document that "sin stocks" (alcohol, tobacco, and gambling) earn relatively high returns on a risk-adjusted basis. We revisit their original study with an updated sample. Contrary to the stylized facts that prominent anomalies attenuate out-of-sample or in the post-publication period (McLean and Pontiff, 2016, Does academic research destroy stock return predictability? The Journal of Finance 71, 5-32), we document that the superior performance of sin stocks has persisted over the most recent decade (2009–2018). This is consistent with the increased popularity of socially responsible investing over recent decades, pushing more norm-constrained investors away from sin stocks. Further analyses suggest that sin stocks outperform in low-liquidity states and in high-uncertainty states and are recession-proof. Overall, our work supports the shunned stock hypothesis and indicates the price of sin stocks is alive and well.

1. Introduction

To understand the impact of social norms on financial markets, Hong and Kacperczyk (2009), henceforth HK2009, examine the historical performance of "sin stocks", the common shares of publicly listed firms that are involved in the production of alcohol, tobacco and gaming (known as the "Triumvirate of Sin"). They document a strong sin stock anomaly in the United States over the period 1965–2006, namely, that an equal-weighted portfolio strategy, which goes long sin stocks and short the comparable stocks, earns an annualized return of 3% after accounting for the Carhart (1997) four factors. Statman and Glushkov (2009) confirm an anomalous sin stock premium of similar economic magnitude over the period 1992–2007. Moreover, Fabozzi, Ma, and Oliphant (2008) and Durand, Koh, and Tan (2013) provide further evidence that the "price of sin" prevails in international stock markets.[1]

HK2009 attribute the anomalous sin stock return to the existence of (increased) social norms that constrain certain investors from engaging in industries or sectors that are deemed unethical. Socially responsible investing (SRI) and/or other ethical motives adopted by managers of norm-constrained institutions leads to a shortage of demand for these shunned stocks (*i.e.*, the shunned stock hypothesis).[2] These neglected sin stocks have a relatively small investor base (and limited risk-sharing capacity), and are thus traded at a discount. Interestingly, the impact of social norms on sin stocks could also interact with legal and religious environments, generating a persistent difference in the price of sin across countries. For example, Salaber (2007) documents that the sin stock premium is higher in European countries where the underlying firms face higher litigation risk and a more Protestant set of beliefs.

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[1] We are aware that there is no universal definition of sin stocks. For example, besides alcohol, tobacco and gaming industries, HK2009 also include the gun industry in their robustness checks because weapons manufacturers are considered by some as promoting human vice, crime, and warfare. Blitz and Fabozzi (2017) also note that there is no consensus on sin stocks, as some researchers adopt a broader definition of "vice stocks" by including firms that operate in alcohol, tobacco, gambling, sex-related industries, weapons, military, and even nuclear power sectors (*e.g.*, Lobe and Walkshausl 2016). We follow strictly the definition of HK2009, so that we could evaluate the out-of-sample and post-publication performance of sin stocks.

[2] Throughout the article, we use the terms sin stocks and shunned stocks interchangeable.

In this paper, we revisit the topic of sin stocks with an updated sample of HK2009. Our aim is two-fold:

First, we want to verify whether the impact of social norms on asset price (i.e., a particular form of limits to arbitrage) would diminish after the academic publication of HK2009. McLean and Pontiff (2016) posit that academic publication reduces limits to arbitrage as investors become aware of the existence of mispricing. They document that portfolio returns based on published prominent anomalies/return predictors drop by 26% out of sample and 58% post publication. A similar notion is expressed in Jacobs and Muller (2020), who find a reliable post-publication decrease in the US. Moreover, Blitz and Fabozzi (2017) argue that the anomalous high return of sin stocks, to a large extent, can be explained by their exposures to the two new quality factors (*i.e.*, profitability and investment) in the Fama and French (2015) five-factor model. However, there are also good reasons to expect that the price of sin is still alive and well because SRI and ethical investment have been gaining momentum over the most recent decade (2009–2018), pushing more investors (further) away from sin stocks. To the extent that the sin stock premium arises mainly from the *systematic* "ignorance" by social-norm-constrained investors (that persists till today), the publication of HK2009 and other related studies would have little, if any, impact on the "correction" of the price of sin.[3] This is because whether the arbitrage capital (i.e., the social-norm-constrained investors) become aware of the publication or not, they remain unable to act on the sin stock anomaly due to social norms. To the best of our knowledge, no other study has conducted a post-publication analysis of HK2009.[4] In other words, we are the first to check the (possible) impact of social norms on stock price subsequent to academic publication (*i.e.*, post 2009).

Second, we want to validate the shunned stock hypothesis (*i.e.*, social norms) by examining the time

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[3] Over the recent decade, there is an increasing trend across the globe to engage in more socially responsible investing, or more broadly termed as impact investing (see Höchstädter and Scheck, 2015). This (increased) emphasis on social or moral impacts could push more investors away from sin stocks, "strengthening" the price of sin over time.

[4] Adding to the importance of our study is the fact that the recent decade (*i.e.,* 2009–2018) is an interesting period when many conventional investment styles, such as size, value, profitability, and investment, did not offer a positive risk premium (see Fama and French 2020; Blitz, 2020).

variation of the anomalous sin stock returns under different market states, proxied by aggregate liquidity, economic recession, economic policy uncertainty, and investor sentiment. Prior works have focused mainly on the unconditional performance of sin stocks, and use the anomalous returns as the supporting evidence of the shunned stock hypothesis (*e.g.*, Hong and Kacperczyk 2009; Statman and Glushkov 2009). However, the shunned stock hypothesis builds on the assumption of limits on arbitrage. For example, HK2009 argue that not enough capital is employed to bear on sin stocks, which leads to the anomalous return of sin stocks. However, limits on arbitrage (and arbitrage capital) are not stable over time. Therefore, exploring the conditional performance of sin stocks under different market states would help shed more light on the possible source(s) of the sin stock anomaly. Our empirical analysis leads to the following findings:

- First, we find sin stocks remain a viable investment vehicle during the extended sample period of 1963–2018. The seven-factor alpha of the alcohol, tobacco, and gaming stocks amounts to 43 basis points per month for the full sample.

- Second, contrary to the widely held view that prominent anomalies tend to decline post publication (McLean and Pontiff 2016; Jacobs and Muller 2020), sin stocks continue to yield sizeable risk-adjusted returns post publication of HK2009. The risk-adjusted performance even enlarges in the most recent decade (*i.e.*, 2009–2018), which is consistent with the increasing trend of ethical investments in recent decades that pushes more investors away from these shunned stocks.

- Third, consistent with the implications of the shunned stock hypothesis, the sin stock anomaly time varies under different market states. The anomalous return of sin stocks is larger when market liquidity is low (*i.e.*, arbitrage capital is too scarce to bear on sin stocks). Moreover, as sin stocks rely less on equity financing (due to a smaller investor base), their prices suffer less in periods of elevated economic uncertainty and recessions.

Our paper relates to the evolving literature on asset pricing anomalies (McLean and Pontiff 2016;

Jacobs and Muller 2020). It contributes to our understanding of the sources of the asset pricing anomalies through the lens of a particular form of limits to arbitrage, social norm. Existing literature on the effect of limits to arbitrage focuses mainly on short-sale constraints, as they are one of the most "visible" forms of limits to arbitrage (Jones and Lamont 2002; Lamont and Thaler 2003; Nagel 2005; Gromb and Vayanos 2010). Using various proxies of short-sale constraints such as breadth of ownership, institutional ownership, short interests, and short costs, a number of studies have established that stocks with more binding short-sale constraints tend to be more overpriced, and thus the overpricing-related anomalies stem mainly from the short leg— those speculative stocks that are relatively difficult to sell (Chen, Hong, and Stein 2002; Nagel 2005; Hirshleifer, Teoh, and Yu 2011). We, however, explore another distinctive form of limits to arbitrage, social norm. Our evidence suggests that social norm acts as an "invisible" form of limits to arbitrage that delay the flow of wealth from irrational to sophisticated investors (Shleifer and Vishny 1997). We highlight the distinctive nature of social norm-induced mispricing: The systematic "ignorance" of a subset of stocks due to social or ethical reasons is persistent over time, and its associated anomalous return does not decay after the academic publication. To the extent that social norms (i.e., the invisible form) continue to prevent sophisticated norm-constrained investors from buying these shunned stocks, the publication of academic research would have no impact on this *underpricing*-related anomaly.[5]

More crucially, the paper contributes to our understanding of the dynamic features of the social norm-induced anomaly by showing that the anomalous sin stock return time varies under different market states. Consistent with the implications of shunned stock hypothesis, we document that the anomalous return of sin stocks is larger in low-liquidity periods than in high-liquidity periods, because arbitrage capital becomes more scarce in low-liquidity states. Besides, as sin stocks rely less on external equity

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[5] Even though the publication of academic research brings to investors' attention and increase their awareness of this underpricing-related anomaly, the nature of social norm dictates that arbitrage capital still cannot trade on these sin stocks. The persistence of social norm is like the "force" of risk, which will not be easily altered by the publication of academic research. Therefore, it is different from the case of the overpriced-related anomaly, which discerning investors could quickly act on it once they are aware of the opportunity (after the publication of academic research).

financing (i.e., a direct consequence of being shunned), these stocks outperform or suffer less in periods of elevated economic uncertainty and recessions. All of these features better depict the economic mechanism of social norms on asset prices.

The remainder of the paper is organized as follows. Section 2 develops the testable hypotheses. Section 3 describes the data sources and the methodology. Section 4 presents the empirical results. Section 5 concludes.

2. Background of Sin Stocks and Hypotheses Development

2.1. Background of Sin Stocks

The analysis of sin stocks provides a broad perspective to understand the impact of social norm on financial markets. HK2009 examine the "Triumvirate of Sin", namely the alcohol, tobacco, and gambling industries. Due to their (common) addictive properties and undesirable social consequence related to excessive consumption in their products, these three industries have been considered as sinful by many individuals and social groups. It is now widely known that the addiction to alcohol could lead to a series of serious health and mental issues. Similarly, tobacco consumption (i.e., cigarette smoking) is causally related to lung cancer.[6] For that reason and under social pressures, all broadcast advertising of tobacco products in the US was banned in 1971. Likewise, gambling has long been considered as a vice that corrupts the society. Due to the concerns about its (possible) involvement with money laundry and other crimes, gambling is heavily regulated in most countries around the world.[7]

The negative social perception on the alcohol, tobacco, and gambling has direct consequences on the financing and pricing of these sin stocks. For example, sin stocks are removed from the stock pool (i.e., mandate) by large pensions and other institutions that are subject to social norm pressures

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[6] See for example HHS (Department of Health and Human Services) report "The health consequences of smoking—50 years of progress: A report of the Surgeon General." https://pubmed.ncbi.nlm.nih.gov/24455788/

[7] Besides the "Triumvirate of Sin", HK2009 also consider the weapon industry (guns) as another candidate of sin stocks, and include it in their robustness checks.

(Durand, Koh, and Limkriangkrai 2013; Liston and Soydemir 2010; Salaber 2013).[8] HK2009 document that sin stocks are held in smaller proportions by institutions than comparable non-sin stocks. Blitz and Swinkels (2021) find that U.S. norm-constrained sovereign wealth funds and pension funds underweight tobacco stock, compared to peer stocks. They also find that passive managers have large stakes in tobacco stocks indicating that passive indexers are not yet concerned with screening for ethical investing. Given the weak interests from institutions, fewer (sell-side) analysts cover these firms, making the information of these sin stocks more sparse than comparable non-sin stocks. Consistent with the neglect on the sin stocks, HK2009, among others, confirm that the sin stocks have a persistently low valuation ratio compared to comparable non-sin stocks.

2.2. Hypotheses Development

As is clarified in the introduction section, HK2009 document a strong sin stock anomaly over the sample period 1965 – 2006 (see tables in HK2009). Therefore, without loss of generality, we define the "post-publication" period as from 2009 to 2018, which is post the publication date of HK2009. Similarly, we define the "out-of-sample" period as from 2007 to 2018, which is post the "in-sample" period examined in HK2009. While the out-of-sample period covers a longer period that is not examined in HK2009, it also includes the 2007–2008 GFC that is known to bias downwards the performance of risky assets (including sin stocks). Therefore, we base our analysis mainly on the post-publication period.

Our hypotheses on the post-publication performance of sin stocks can be summarized as follows:

Hypothesis 1a: *The performance of sin stocks deteriorates over the 2009–2018 period.*

We have a number of reasons to support the above conjecture. First, the concern of data snooping. The identification of some market anomalies could well be a result of data snooping or data crunching

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[8] According to the U.S. Social Investment Forum (SIF) 1995–2012 biannual surveys, over 90% of the funds use three or more screens to constrain their investments in sinful businesses. The top four screens based on the SIF surveys between 1995 and 2005 were tobacco, alcohol, gaming, and weapons.

(Marquering, Nisser, and Valla 2006; Harvey, Liu, and Zhu 2016). That is, some seemingly price anomalies (due to data mining) work well in sample, but their return predictability does not carry over out of sample. Therefore, these pricing patterns are likely to disappear soon after they are reported.

Second, academic research destroys return predictability. Even without the concern of data snooping, the publication of anomalies and their associated return predictability brings attention from academics, practitioners, and investors. McLean and Pontiff (2016) suggest that portfolio returns (based on published prominent anomalies/return predictors) drop by 26% out of sample and 58% post publication. The post-publication decrease in return predictability is found to be more pronounced in the US (Jacobs and Muller 2020). This provides another motivation to examine whether sin stocks remain a viable investing vehicle following the publication of the seminal work by HK2009.

Third, increased market liquidity and market efficiency over time. Chordia, Subrahmanyam, and Tong (2014) posit that capital markets have become more efficient in recent decades with increased market liquidity and trading activity. The increased risk arbitrage in an era of high liquidity reduces the return predictability of prominent anomalies. They find consistent evidence that most anomalies have attenuated and the average returns from a portfolio strategy based on prominent anomalies have approximately halved after decimalization. This time trend also contributes to our motivation to verify whether investing in sin stocks remains a portfolio strategy with superior performance over time.

Hypothesis 1b*: The performance of sin stocks remains robust (or even increases) over the 2009–2018 period.*

Despite the existing evidence that prominent return anomalies tend to shrink post publication, there are still good reasons to believe that sin stocks can continue to deliver superior performance in recent years. First, increased attention to social norms and the popularity of ethical investment. HK2009 attributes the superior performance of sin stocks to social norms because ethical investors, especially some large institutional investors, explicitly exclude these vice stocks in their investment mandate as a way to promote their compliance with ethical investment or moral standards. There is also increased

popularity in ethical investment among institutional investors. These trends on SRI have intensified more than ever (Derwal, Koedijk, and Ter Horst 2011). As a result, the neglect of sin stocks might be intensified, which translates to a persistent price discount among sin stocks in the most recent decade (*i.e.*, 2009–2018).

Second, sin stocks are low-risk investment vehicles. According to HK2009, sin stocks behave similarly as counter-cyclical instruments, and yield relatively better investment performance than comparable stocks during bad times. Blitz and Fabozzi (2017) also note that these shunned stocks are low-beta instruments that offer a higher risk-return trade-off. The most recent decade (*i.e.*, 2009–2018) witnessed a number of challenges in the financial markets including quantitative easing, the European sovereign debt crisis, and etc. Given the features of the 2009–2018 period, we might observe that the portfolio performance of sin stocks remains robust because they are staple investment vehicles in bad economic weather.

Next, we formulate the hypotheses regarding the relative performance of sin stocks under different market states:

Hypothesis 2a*: The performance of sin stocks remains strong or becomes even stronger in low-liquidity states.*

HK2009 provide firm-level evidence that vice stocks have lower institutional ownership and less analyst coverage, supporting their shunned stock hypothesis (*i.e.*, sin stocks are being effectively neglected by an important set of investors due to social norms). The shunned stock hypothesis builds on the seminal work of Merton (1987) on neglected stocks and segmented markets. Implicit in the shunned stock hypothesis is the assumption that not enough arbitrage capital is brought to bear on sin stocks due to the constraints in social norms (Hong and Kacperczyk 2009). In fact, the amount of arbitrage capital also varies over time, and it becomes particularly scarce when the overall market liquidity is low. To the extent that arbitrage capital or, more broadly, demand on sin stocks does not increase in low-liquidity states, we would expect that the anomalous sin stock returns would remain

relatively strong or become even stronger in low-liquidity states.

Hypothesis 2b*: The performance of sin stocks becomes weaker in low-liquidity states.*

It should also be noted that if the high average return of sin stocks represents the rational compensation of illiquidity or illiquidity risk, then we would expect the exactly opposite conditional pattern: That is, these sin stocks would have the worst performance at exactly the time when these risks "materialized" (i.e., in low-liquidity states). Therefore, a careful examination on the performance of sin stocks in low-liquidity periods can help differentiate whether the price of sin stems from the lasting impact of social norms or from the rational compensation of illiquidity.

Hypothesis 3*: The performance of sin stocks remains strong or becomes even stronger in high-economic-uncertainty states or in recessions.*

In principle, investors are uncertainty-averse and may cease or reduce their participation in the stock market with heightened economic uncertainty. Therefore, firms that are more dependent on external equity financing would suffer more during high-uncertainty states or in recession periods (Braun and Larrain 2005). Vice firms, on the other hand, rely more on private debt financing than equity financing (Hong and Kacperczyk 2009). Therefore, they depend less on financial markets than other firms do during periods of elevated uncertainty or recessions. Besides, sin stocks are usually considered as "recession-proof" due to their unique business nature (Salaber 2009). Anecdotal evidence suggests that vice consumption, such as alcohol, tobacco, and gaming, is stable relative to other industries during market downturns. Therefore, we would predict that the sin stock premium would accrue during high-economic-uncertainty states or in recessions.

We validate these hypotheses in the rest of the paper.

3. Data and Methodology

3.1. Sample

The sample stock data are retrieved from the CRSP/Compustat merged database. We consider only firms listed on NYSE, AMEX, and NASDAQ. All companies must have CRSP share codes of 10 or 11. To identify the sin stocks in the US, we follow the same procedure as HK2009 that relies on industry classification of SIC and NAISC codes for alcohol, tobacco, gambling, and weapons. To be specific, alcohol stocks are those with the SIC codes of 2100–2199, tobacco stocks are those with the SIC codes of 2080–2085, and weapons stocks are those with the SIC codes of 3480–3489 and 3795. Following HK2009, gambling stocks are identified by their NAISC codes: 7132, 71312, 713210, 71329, 713290, 72112, and 721120. The full sample period covers from July 1963 to December 2018 (*i.e.*, 55 years, equivalent to 666 monthly observations). During the sample period, there are a total of 157 sin stocks that operate in the alcohol, tobacco, and gambling industries (hereafter ATG). The ATG sample corresponds to the sin stock sample examined in HK2009. When we augment the list with the weapons industry, we have a total of 218 sin stocks (hereafter ATGW). The ATGW sample corresponds to the alternative sin stock sample used as robustness checks in HK2009.

The Fama and French (2015) five factors – the market factor (RMRF), the size factor (SMB), the value factor (HML), the profitability factor (RMW), and the investment factor (CMA) – and the momentum factor (MOM) and the short-term reversal factor (STREV) are obtained from the Ken French Data Library.[9] The (monthly) risk-free rate is measured by the one-month T-bill rate, which is also retrieved from the Ken French Data Library.

The Pastor and Stambaugh (2003) aggregated liquidity index is retrieved via WRDS. The NBER recession indicator is from the webpage of the Federal Reserve Bank of St. Louis. The investor sentiment index is from Jeffrey Wurgler's webpage[10] and Economic Policy Uncertainty (EPU) from the Economic Policy Uncertainty webpage.[11]

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[9] https://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html

[10] http://people.stern.nyu.edu/jwurgler/

[11] https://www.policyuncertainty.com/

3.2. Methodology

At the start of each month beginning July 1963 and ending December 2018, we form two sin stock portfolios, ATG and ATGW. The ATG portfolio includes all sin stocks that operate in the production of alcohol, tobacco, and gambling, while the ATGW portfolio includes additional stocks that operate in the production of weapons (*i.e.,* guns). Following HK2009, we compute the monthly returns of the two equally weighted sin stock portfolios.

To evaluate the portfolio performance of the sin stocks, we adopt various benchmark models, which include CAPM (equation 1), Fama and French (1993) three-factor (equation 2), Fama and French (2015) five-factor (equation 3), Fama and French (2018) six-factor (equation 4), and the augmented seven-factor model with a short-term reversal factor (equation 5).

$$R_{i,t} - R_{f,t} = \alpha + \beta \left(R_{m,t} - R_{f,t} \right) + \varepsilon_t \tag{1}$$

$$R_{i,t} - R_{f,t} = \alpha + \beta_1 \left(R_{m,t} - R_{f,t} \right) + \beta_2\, SMB + \beta_3 HML + \varepsilon_t \tag{2}$$

$$R_{i,t} - R_{f,t} = \alpha + \beta_1 \left(R_{m,t} - R_{f,t} \right) + \beta_2\, SMB + \beta_3 HML + \beta_4\, RMW + \beta_5 CMA + \varepsilon_t \tag{3}$$

$$R_{i,t} - R_{f,t} = \alpha + \beta_1 \left(R_{m,t} - R_{f,t} \right) + \beta_2\, SMB + \beta_3 HML + \beta_4\, RMW + \beta_5 CMA + \beta_6\, \text{MOM} + \epsilon_t \tag{4}$$

$$R_{i,t} - R_{f,t} = \alpha + \beta_1 \left(R_{m,t} - R_{f,t} \right) + \beta_2\, SMB + \beta_3 HML + \beta_4\, RMW + \beta_5 CMA + \beta_6\ \text{MOM} + \beta_7\ \text{STREV} + \varepsilon_t \tag{5}$$

where $R_{i,t}$ represents the raw return of the sin stock portfolio *i* over month *t*, $R_{f,t}$ the risk-free rate on month *t*, $R_{m,t}$ the market return on month *t*, the size factor (SMB), the value factor (HML), the profitability factor (RMW), and the investment factor (CMA), plus momentum (MOM) and the short-term reversal factor (STREV).

4. Empirical Results

4.1. Post-publication Performance of Sin Stocks

In this subsection, we verify whether the anomalous return of sin stocks persists over time, and in

particular, over the period following the seminal publication of HK2009. **Figure 1** visualizes the full-sample performance of investing in the two sin stock portfolios (ATG and ATGW) and the market portfolio from July 1963 to December 2018. As it stands, ATG (ATGW) outperforms the market portfolio over the full sample period.

In **Panel A** of **Table 1**, the average excess return of the ATG (ATGW) portfolio amounts to 1.12% (1.12%) per month. The risk-adjusted returns of ATG (ATGW) range from 0.28% (0.23%) to 0.60% (0.57%) under the alternative factor models, which are all significant at the 10% or finer levels. In particular, the portfolio holding alcohol, tobacco, and gaming stocks (ATG) generates a seven-factor alpha of 0.43% per month with a Newey-West t-statistic of 2.71. The augmented portfolio with weapons stocks (ATGW) also offers a similar performance with a seven-factor alpha of 0.36% per month (with a Newey-West t-statistic of 2.76). **Panel B** of the table presents the factor loadings of the portfolio. We find consistent results as in Blitz and Fabozzi (2017) that sin stocks tend to be quality firms that load positively on the profitability and investment factors. Sin stocks also load negatively on the momentum factor, indicating that they are not the "hot" stocks chased by trend followers. Overall, the sin stock performance seems to be persistent over the 1963–2018 sample period.

[Insert Table 1 here]

Next, we examine the out-of-sample performance of the sin stock portfolios. During the out-of-sample period from January 2007 to December 2018, the average excess return of the ATG (ATGW) portfolio amounts to 1.05% (1.04%) per month (see **Table 2**), which is lower than its full sample counterpart. The risk-adjusted performance retains more or less the same value in magnitude. For example, the seven-factor alpha of ATG (ATGW) amounts to 43 (37) basis points (bps) per month, which is almost equivalent to its full-sample average. However, it is not significant, with a t-statistic of 1.56 (1.67). The fact that all the (risk-adjusted) returns are only marginally significant is not surprising because the out-of-sample period (post 2006) includes the 2007–2008 GFC, which massively drops down the average return of the sin stock portfolios and amplifies the return variation.

From an economic perspective, the sin stock portfolios remain a viable investment vehicle in the out-of-sample period, because the economic magnitude does not decay out of sample.

[Insert Table 2 here]

Finally, we examine the post-publication performance of the sin stock portfolios between 2009 and 2018. The post-publication period enables us to better validate the competing hypotheses **1a** and **1b**, as it excludes the 2007–2008 GFC, an extreme period that is certain to bias downwards the portfolio performance. During the most recent decade between 2009 and 2018, the average excess return of the ATG (ATGW) portfolio increases to 1.93% (1.81%) per month (see **Table 3**). Moreover, the risk-adjusted returns range from 71 to 85 (59 to 75) bps per month, which are all significant at the 5% or finer level. Both the raw returns and the risk-adjusted returns are much larger than their full-sample counterparts, indicating that the sin stock anomaly strengthens over the most recent decade (2009–2018).

When interpreting the evidence collectively from **Tables 2** and **3**, it becomes clear that the performance of sin stocks remains robust and even increases over the post-publication period, supporting **Hypothesis 1b**. This is consistent with the recent trend of the (increased) popularity of SRI investments, which pushes more (norm-constrained) investors away from the shunned stocks. Moreover, the sin stock anomaly behaves differently from other prominent anomalies that usually have drops in their returns during the out-of-sample and post-publication periods (Mclean and Pontiff 2016); making sin stocks a viable investment vehicle in the most recent decade (*i.e.*, 2009–2018).

[Insert Table 3 here]

4.2. Sin Stocks and Market States

In this subsection, we extend the shunned stock hypothesis by examining the sin stock performance under different market states.

According to the shunned stock hypothesis in HK2009, the anomalous return is the compensation for the constrained investor base and limited risk-sharing of sin stocks. Implicit in the shunned stock

hypothesis is the assumption of limited arbitrage capital: Not enough arbitrage capital is brought to bear on sin stocks because of the constraints in social norms. Therefore, we would expect the anomalous sin stock returns to remain stable or even "materialize" in low-liquidity states because arbitrage capital becomes more scarce when market liquidity is low (**Hypothesis 2a**). We define a month as in high (low) liquidity states if the Pastor and Stambaugh (2003) aggregated liquidity level in the prior month is above (below) the sample median. **Panel A** of **Table 4** seems to support our conjecture (**Hypothesis 2a**): In general, the risk-adjusted returns of ATG (ATGW) are stronger in a low-liquidity state than in a high-liquidity state. For the ATG portfolio, its alpha is usually two or three times larger in a low-liquidity state than that in a high-liquidity state. In unreported analysis, we also test the return difference in low- and high-liquidity states, and find that the mean value in low-liquidity states are statistically larger than that in high-liquidity states at the 10% or finer levels for the ATG portfolio (based on one-sided test). These results also indicate that the anomalous return of sin stocks is not a *pure* compensation of illiquidity or illiquidity risk. Otherwise, we would observe that the (conditional) alpha to be much weaker in low-liquidity periods, which is inconsistent with the documented pattern in **Panel A** of the table.

[Insert Table 4 here]

As a comparison, we also look at the relative performance of sin stocks under different investor sentiment states, as most anomalies tend to be related to market sentiment (Baker and Wurgler 2006; Stambaugh *et al*. 2012). For example, Stambaugh *et al*. (2012) document that investor sentiment has a profound impact on 11 well-known anomalies, and each anomaly is stronger in high sentiment states. We define a month as in high (low) sentiment states if the Baker and Wurgler (2006) sentiment index at the end of the prior month is above (below) the sample median. Unlike other prominent anomalies, the risk-adjusted performance of sin stocks remains stable in low-sentiment states as well as in high-sentiment states (see **Panel B** of **Table 4**). After accounting for the risk exposure, the return difference of the ATG (ATGW) portfolio between low- and high-sentiment periods is virtually zero, and is statistically insignificant (un-tabulated for brevity purpose). This indicates that sin stocks are not the

"buzz" stocks chased by investors in a broad wave of sentiment.

The shunned stock hypothesis also posits that sin stocks rely more on private debt financing than equity financing due to a smaller investor base caused by social norms. The shunned stock effect could interact with economic uncertainty. In principle, investors are uncertainty-averse and may cease or reduce their participation in the stock market with heightened economic uncertainty. Therefore, sin stocks are expected to retain high performance or (even) outperform in periods of elevated uncertainty because they rely less on external financing in the stock market (**Hypothesis 3**).

Panel A of **Table 5** presents the performance of sin stocks conditional on economic uncertainty. We define a month as in high (low) uncertainty, if the EPU index value at the end of the prior month is above (below) the sample median. The ATG (ATGW) portfolio delivers a monthly excess return of 2.11% (2.15%) in a high-EPU state, while it only offers an average excess return of 36 (37) bps per month in a low-EPU state. The same contrast applies to the risk-adjusted returns under different EPU states: The seven-factor alpha amounts to 86 (77) bps with a t-statistic of 2.90 (3.22) in the high-EPU state, but it turns insignificant in the low-EPU state with a value of 26 (28) bps per month. We also test the (risk-adjusted) return differentials between high- and low-EPU states, and find that mean value in the high-EPU state is statistically larger than that in the low-EPU state at the 10% or finer levels for the two sin stock portfolios (unreported for brevity).

[Insert Table 5 here]

Panel B of **Table 5** presents the performance of sin stocks conditional on the NBER recession indicator. While the average excess returns are smaller in the recession periods than in the non-recession periods, the risk-adjusted performance exhibits a different pattern. In most cases, the alphas of the ATG (ATGW) portfolio have larger values in recession than in non-recession periods, which seems to corroborate the conventional wisdom that sin stocks are recession-proof. However, the (risk-adjusted) return differentials between recession and non-recession periods are not statistically

different for the two sin stock portfolios (unreported for brevity).[12]

Overall, we find consistent evidence that the performance of sin stocks is relatively strong in high-economic-uncertainty states or in recessions (**Hypothesis 3**). The outperformance of sin stocks in bad times supports the implications of the shunned stock hypothesis. Because sin stocks rely less on external financing from stock markets, they are less influenced in the states of elevated economic uncertainty and recessions.

5. Conclusion

This paper revisits the performance of sin stocks. Based on the extended sample, we analyze whether the performance of sin stocks, like other prominent anomalies, deteriorates out of sample or post publication. We find that the sin stock anomaly is robust during the extended sample period from 1963 to 2018. It generates a monthly return of 43 basis points per month for the full sample after properly accounting for the risk exposures. Unlike other prominent anomalies, sin stocks continue to yield sizeable risk-adjusted returns post the publication of HK2009. The risk-adjusted performance even enlarges in the most recent decade (*i.e.*, 2009–2018), which is consistent with the increasing trend of ethical investments in recent decades that pushes more investors away from these shunned stocks.

The paper also sheds light on the (possible) source of the sin stock anomaly. Consistent with the implications of the shunned stock hypothesis, we document that the sin stock anomaly time varies under different market states. The anomalous return of sin stocks is larger in low-liquidity periods than in high-liquidity periods, as arbitrage capital is more scarce when market liquidity is low. As sin stocks rely less on external equity financing, a direct consequence of being shunned, these stocks

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[12] We caution the readers that there are several caveats when interpreting the results that sin stocks are recession-proof. First, return variations are much larger in recession than in non-recession periods. Second, although we have a 55-year sample, there are only a small number of recessions (i.e., only eight recession episodes in between 1963 and 2018, see **Figure 1**). Both caveats dramatically reduce the power of two-sample statistical tests, making our interpretation extreme difficult. However, irrespective of our interpretation, the bottom line is that sin stocks do not fare quite as badly as other stocks on a risk-adjusted basis during historical recessions.

outperform (or suffer less) in periods of elevated economic uncertainty and recessions. Overall, our findings support the shunned stock hypothesis and indicate the price of sin stocks is alive and well. These new findings may also be of interest for investments and asset allocation decisions, as less socially constrained practitioners can incorporate the conditional features of shunned stocks to form a customized, robust, and efficient portfolio. We leave these endeavors as potential research routes in the future.

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Figure 1. Portfolio Value of the Sin Stocks: 1963/07-2018/12.

The figure plots the portfolio values of the market portfolio, the ATG portfolio (that invests in alcohol, tobacco, and gambling stocks), and ATGW portfolio (that invests in alcohol, tobacco, gambling, and weapons stocks), accumulated over the sample period between July 1963 and December 2018. The grey bar denote the NBER recession periods. To facilitate comparison, all portfolios have been normalized to have an *ex post* return volatility of 5% per year over the full sample period. An equal amount of $1 is invested for all strategies at the beginning of the sample period.
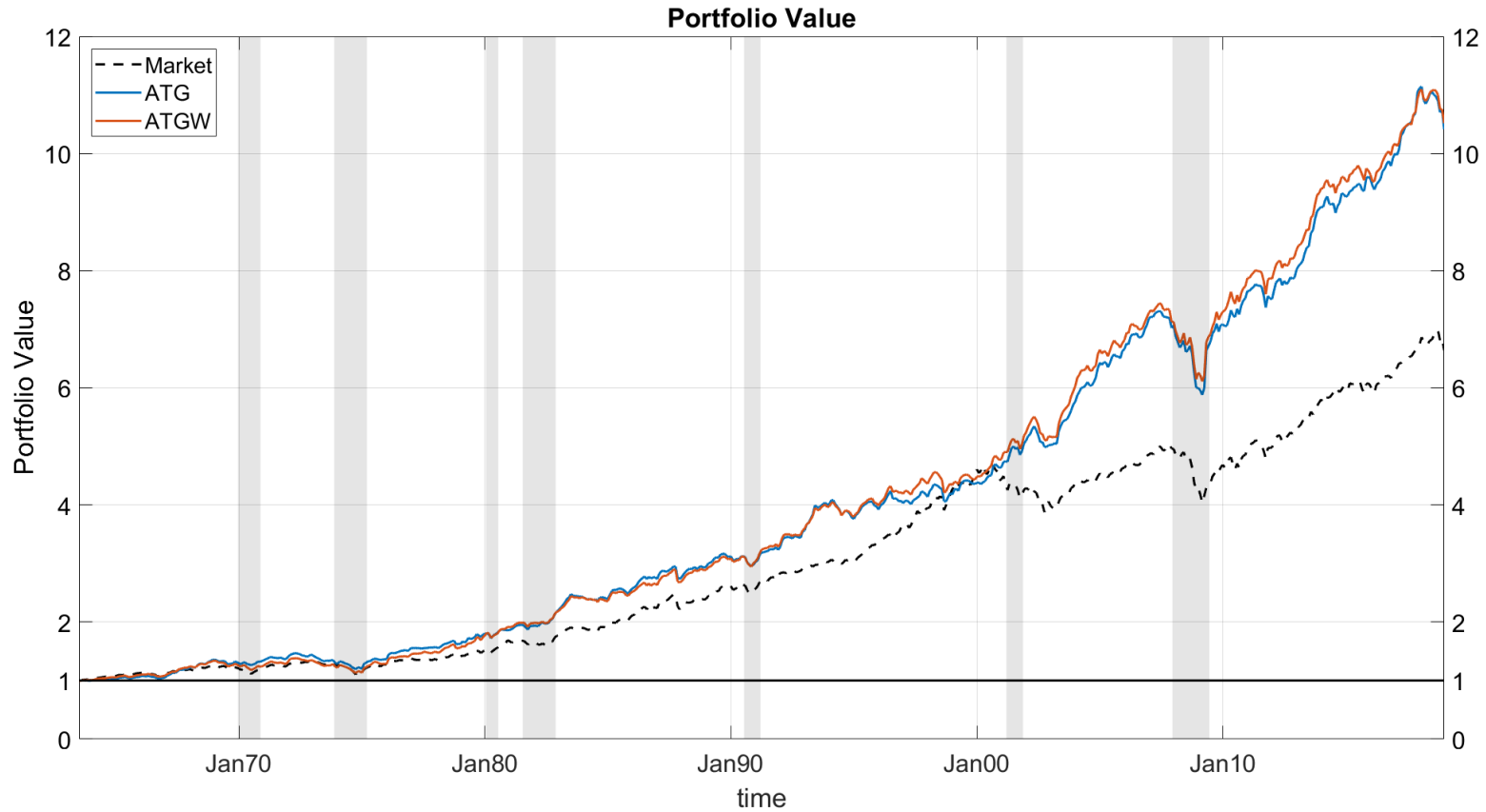
Table 1: Portfolio performance of sin stocks, full sample: 1963/07-2018/12.

This table reports the monthly performance of the equal-weighted long-only sin stock portfolios. ATG stands for the portfolio that includes alcohol, tobacco, and gambling stocks, while ATGW stands for the portfolio that includes alcohol, tobacco, gambling, and weapons stocks. Panel A reports the average monthly excess returns and the risk-adjusted returns under the CAPM, Fama-French three- (FF3), five- (FF5), six- (FF6), and augmented seven-factor (FF7) models. Panel B reports the alpha and factor loadings of the augmented seven-factor model (FF7). RMRF, SMB, HML, RMW, CMA, MOM, and STREV denote the market, size, value, profitability, investment, momentum, and short-term reversal factors, respectively. Newey-West adjusted t-statistics with a lag length of 12 are reported in brackets. Adj.R^2 is the adjusted R-square, and Obs. is the number of observations. The sample period runs from July 1963 to December 2018.

Panel A: Excess returns and risk-adjusted returns under CAPM, FF3, FF5, FF6, and FF7 models

	Exret	CAPM Alpha	FF3 Alpha	FF5 Alpha	FF6 Alpha	FF7 Alpha
ATG	1.12	0.60	0.37	0.28	0.44	0.43
[t-stat]	[4.16]	[3.04]	[2.51]	[1.85]	[3.04]	[2.71]
ATGW	1.12	0.57	0.35	0.23	0.36	0.36
[t-stat]	[4.35]	[3.12]	[2.84]	[1.85]	[3.09]	[2.76]

Panel B: Regression outputs under the augmented seven-factor model

	Alpha	RMRF	SMB	HML	RMW	CMA	MOM	STREV	Adj. R^2	Obs.
ATG	0.43	0.96	0.66	0.21	0.28	0.14	-0.22	0.00	0.69	666
[t-stat]	[2.71]	[27.85]	[11.23]	[2.41]	[3.20]	[1.33]	[-2.71]	[0.07]		
ATGW	0.36	1.02	0.75	0.16	0.32	0.19	-0.19	0.00	0.78	666
[t-stat]	[2.76]	[31.04]	[13.52]	[1.82]	[3.90]	[2.25]	[-2.81]	[0.07]		

Table 2: Portfolio performance of sin stocks, post-publication period: 2007/01-2018/12

This table reports the monthly performance of the equal-weighted long-only sin stock portfolios. ATG stands for the portfolio that includes alcohol, tobacco, and gambling stocks, while ATGW stands for the portfolio that includes alcohol, tobacco, gambling, and weapons stocks. Panel A reports the average monthly excess returns and the risk-adjusted returns under the CAPM, Fama-French three- (FF3), five- (FF5), six- (FF6), and augmented seven-factor (FF7) models. Panel B reports the alpha and factor loadings of the augmented seven-factor model (FF7). RMRF, SMB, HML, RMW, CMA, MOM, and STREV denote the market, size, value, profitability, investment, momentum, and short-term reversal factors, respectively. Newey-West adjusted t-statistics with a lag length of 12 are reported in brackets. Adj.R^2 is the adjusted R-square, and Obs. is the number of observations. The sample period runs from January 2007 to December 2018.

	Panel A: Excess returns and risk-adjusted returns under CAPM, FF3, FF5, FF6, and FF7 models					
	Exret	CAPM Alpha	FF3 Alpha	FF5 Alpha	FF6 Alpha	FF7 Alpha
ATG	1.05	0.33	0.40	0.40	0.42	0.43
[t-stat]	[1.53]	[0.99]	[1.24]	[1.30]	[1.42]	[1.56]
ATGW	1.04	0.31	0.39	0.35	0.37	0.37
[t-stat]	[1.61]	[1.00]	[1.36]	[1.27]	[1.58]	[1.67]

	Panel B: Regression outputs under the augmented seven-factor model								
	Alpha	RMRF	SMB	HML	RMW	CMA	MOM	STREV	Adj. R^2	Obs.
ATG	0.43	0.97	0.64	-0.11	0.01	-0.26	-0.44	-0.33	0.73	144
[t-stat]	[1.56]	[16.48]	[3.61]	[-0.75]	[0.04]	[-1.52]	[-3.43]	[-3.90]		
ATGW	0.37	0.96	0.70	-0.16	0.12	-0.04	-0.41	-0.16	0.81	144
[t-stat]	[1.67]	[16.56]	[4.51]	[-1.19]	[0.83]	[-0.29]	[-3.87]	[-2.10]		

Table 3: Portfolio performance of sin stocks, post-publication period excluding GFC: 2009/01-2018/12

This table reports the monthly performance of the equal-weighted long-only sin stock portfolios. ATG stands for the portfolio that includes alcohol, tobacco, and gambling stocks, while ATGW stands for the portfolio that includes alcohol, tobacco, gambling, and weapons stocks. Panel A reports the average monthly excess returns and the risk-adjusted returns under the CAPM, Fama-French three- (FF3), five- (FF5), six- (FF6), and augmented seven-factor (FF7) models. Panel B reports the alpha and factor loadings of the augmented seven-factor model (FF7). RMRF, SMB, HML, RMW, CMA, MOM, and STREV denote the market, size, value, profitability, investment, momentum, and short-term reversal factors, respectively. Newey-West adjusted t-statistics with a lag length of 12 are reported in brackets. Adj.R^2 is the adjusted R-square, and Obs. is the number of observations. The sample period runs from January 2009 to December 2018.

Panel A: Excess returns and risk-adjusted returns under CAPM, FF3, FF5, FF6, and FF7 models

	Exret	CAPM Alpha	FF3 Alpha	FF5 Alpha	FF6 Alpha	FF7 Alpha
ATG	1.93	0.71	0.85	0.84	0.77	0.76
[t-stat]	[3.28]	[2.13]	[2.50]	[2.53]	[2.62]	[2.58]
ATGW	1.81	0.59	0.75	0.71	0.64	0.64
[t-stat]	[3.35]	[2.16]	[2.86]	[2.66]	[2.77]	[2.72]

Panel B: Regression outputs under the augmented seven-factor model

	Alpha	RMRF	SMB	HML	RMW	CMA	MOM	STREV	Adj. R^2	Obs.
ATG	0.76	0.94	0.68	-0.11	0.23	-0.12	-0.48	-0.37	0.70	120
[t-stat]	[2.58]	[11.50]	[3.50]	[-0.75]	[0.81]	[-0.49]	[-3.04]	[-2.09]		
ATGW	0.64	0.91	0.71	-0.09	0.27	0.10	-0.43	-0.19	0.79	120
[t-stat]	[2.72]	[14.65]	[4.84]	[-0.77]	[1.33]	[0.49]	[-3.54]	[-1.24]		

Table 4: Portfolio performance of sin stocks under different market states: Liquidity and sentiment

This table reports the average performance of the equal-weighted long-only sin stock portfolios under different market states. ATG stands for the portfolio that includes alcohol, tobacco, and gambling stocks, while ATGW stands for the portfolio that includes alcohol, tobacco, gambling, and weapons stocks. Both the average monthly excess returns and the risk-adjusted returns under the CAPM, Fama-French three- (FF3), five- (FF5), six- (FF6), and augmented seven-factor (FF7) models are reported. Panel A reports the results under the high- and low-liquidity states based on the Pastor and Stambaugh (2003) aggregated liquidity index, while Panel B reports the high- and low-sentiment states based on the Baker and Wurgler (2006, 2007) sentiment index. The sample period runs from July 1963 to December 2018.

| | Panel A: Market Liquidity | | | | Panel B: Market Sentiment | | | |
| | ATG | | ATGW | | ATG | | ATGW | |
	high	low	high	low	high	low	high	low
Exret	1.01	1.23	1.17	1.08	1.05	1.25	0.90	1.38
[t-stat]	[3.75]	[2.99]	[4.96]	[2.67]	[3.06]	[3.28]	[2.61]	[3.63]
CAPM Alpha	0.31	0.95	0.40	0.79	0.72	0.53	0.54	0.63
[t-stat]	[1.34]	[3.62]	[2.20]	[3.08]	[2.95]	[2.63]	[2.37]	[3.43]
FF3 Alpha	0.17	0.61	0.27	0.45	0.47	0.30	0.31	0.38
[t-stat]	[0.91]	[3.09]	[2.05]	[2.57]	[2.22]	[1.67]	[1.63]	[2.55]
FF5 Alpha	0.13	0.54	0.19	0.37	0.32	0.27	0.11	0.32
[t-stat]	[0.65]	[2.83]	[1.39]	[2.25]	[1.41]	[1.47]	[0.59]	[2.10]
FF6 Alpha	0.11	0.58	0.18	0.36	0.45	0.47	0.26	0.46
[t-stat]	[0.59]	[2.92]	[1.31]	[2.25]	[2.07]	[2.35]	[1.43]	[2.68]
FF7 Alpha	0.28	0.67	0.35	0.44	0.42	0.50	0.22	0.51
[t-stat]	[1.56]	[3.62]	[2.82]	[2.95]	[1.83]	[2.18]	[1.14]	[2.71]
Obs.	333	333	333	333	320	321	320	321

Table 5: Portfolio performance of sin stocks under different market states: EPU and NBER recessions

This table reports the average performance of the equal-weighted long-only sin stock portfolios under different market states. ATG stands for the portfolio that includes alcohol, tobacco, and gambling stocks, while ATGW stands for the portfolio that includes alcohol, tobacco, gambling, and weapons stocks. Both the average monthly excess returns and the risk-adjusted returns under the CAPM, Fama-French three- (FF3), five- (FF5), six- (FF6), and augmented seven-factor (FF7) models are reported. Panel A reports the results under the high- and low-market states based on the economic policy uncertainty (EPU) index, while Panel B reports the recession and non-recession states based on the NBER recession indicator. The sample period runs from July 1963 to December 2018.

| | Panel A: Economic Policy Uncertainty | | | | Panel B: NBER Recession Indicator | | | |
| | ATG | | ATGW | | ATG | | ATGW | |
	high	low	high	low	recession	non-recession	recession	non-recession
Exret	2.11	0.36	2.15	0.37	0.78	1.17	0.48	1.22
[t-stat]	[4.43]	[0.94]	[4.73]	[0.95]	[0.68]	[5.06]	[0.43]	[5.19]
CAPM Alpha	1.05	0.17	1.05	0.16	1.57	0.53	1.27	0.52
[t-stat]	[3.23]	[0.57]	[3.52]	[0.60]	[2.73]	[3.24]	[2.61]	[3.39]
FF3 Alpha	0.83	0.091	0.80	0.12	1.06	0.32	0.78	0.31
[t-stat]	[2.95]	[0.33]	[3.42]	[0.50]	[2.26]	[2.26]	[2.05]	[2.51]
FF5 Alpha	0.78	-0.07	0.71	-0.06	0.52	0.89	0.64	0.18
[t-stat]	[2.77]	[-0.26]	[3.04]	[-0.26]	[1.98]	[1.96]	[1.70]	[1.48]
FF6 Alpha	0.82	0.26	0.75	0.29	0.58	0.54	0.31	0.28
[t-stat]	[2.80]	[0.98]	[3.17]	[1.22]	[2.09]	[1.43]	[0.96]	[2.24]
FF7 Alpha	0.86	0.26	0.77	0.28	0.88	0.30	0.60	0.24
[t-stat]	[2.90]	[0.92]	[3.22]	[1.15]	[2.28]	[2.00]	[1.86]	[1.89]
Obs.	203	203	203	203	83	583	83	583