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Resolving the Sin Stock Anomaly

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Sin Stocks Revisited: *Resolving the Sin Stock Anomaly*

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Stocks of firms that make money from human vice—such as firms in the alcohol, tobacco, gambling, and weapons industries—are typically referred to as "sin stocks," and less popularly as "vice stocks," "shunned stocks," "controversial stocks," and "unethical stocks." Various studies have investigated the historical performance of sin stocks and observed that they have delivered significantly positive abnormal returns. Despite this, many investors have composed an exclusion list of sin stocks that they do not wish to invest in because they do not want to be associated with the activities of these firms. On the other hand, there are also collective investment vehicles that specifically target sin stocks. Although there are no exchange-traded funds that invest in a wide range of sin stocks, there are such vehicles that focus on specific subcategories within the sin stock space.[1]

A popular explanation for the observed abnormal returns of sin stocks is that they are systematically underpriced because so many investors shun them; this enables investors who are willing to invest in sin stocks, going against social norms, to earn a reputation risk premium. In the words of Fabozzi, Ma, and Oliphant [2008, pp. 92–93], "an economic gain might accrue for not conforming to social standards." Hong and Kacperczyk [2009, p. 15] conjecture that "there is a societal norm against funding operations that promote vice, and that some investors, particularly institutions subject to norms, pay a financial cost in abstaining from these stocks." Similarly, Statman and Glushkov [2009, p. 34] suggest that the outperformance of sin stocks is "consistent with the 'doing good but not well' hypothesis, whereby the expected returns of socially responsible stocks are lower than those of conventional stocks." Other explanations proposed in these studies are that sin industries could benefit from monopolistic returns, or that these stocks face increased litigation risk for which investors are rewarded.[2]

In this article, we take a fresh look at the performance of sin stocks, using global data until the end of 2016 and applying the latest insights in asset pricing theory. We find that, consistent with the existing literature, sin stocks exhibit a significantly positive CAPM alpha in the U.S., European, and global samples. However, this alpha disappears completely when controlling not only for classic factors such as size, value, and momentum, but also for exposures to the two new Fama and French [2015] quality factors—profitability and investment. For Japan, sin stocks also exhibit significant exposures to the profitability and investment factors, but in this case the one-factor alpha is not even significant to begin with. In sum, the performance of sin stocks is fully in line with their exposures to factors included in

current asset pricing models, and there is no evidence of a specific sin premium next to that.

Before we discuss our data, methodology, and results, we briefly review the various definitions of sin stocks used by market observers and participants. This is important for our subsequent discussion of the literature because differences in conclusions can often be traced to differences in the definition of sin stocks.

DEFINING SIN STOCKS

Various industries and sectors have been treated as if they include sin companies. What has been defined as a sin industry or sector is critical because empirical evidence has not always used generally accepted definitions. An investor doing an Internet search would find the following definition on a popular website, *Investopedia*:[3]

> A stock of a company either directly involved in or associated with activities widely considered to be unethical or immoral. Sin stocks are found in sectors whose activities are frowned upon by some or most of society, because they are perceived as making money from exploiting human weaknesses and frailties. Sin stock sectors therefore include alcohol, tobacco, gambling, sex-related industries, weapons manufacturers, and the military.

Investopedia also argues that sin stocks "are the polar opposite of ethical investing and socially responsible investing, whose proponents emphasize investments that benefit society." However, there is no consensus on this. As noted by a website dedicated to sin stocks, *Sin Stock Report*,[4] "Contrary to popular belief, sin stock investing is NOT the opposite of ethical investing or socially responsible investing, since ethical investors create their own ethical definitions which may or may include some or all sin stocks."

Sin Stock Report states that the big three subcategories are alcohol sin stocks, tobacco sin stocks, and gambling sin stocks. In addition, three other subcategories include weapons (conflict) sin stocks, sex (porn) sin stocks, and marijuana sin stocks. The last subcategory is relatively new and has not been included in any empirical studies of sin stock performance as of this writing.

There are even more sectors though that could be included in the sin stock category. According to *Sin Stock Report*, companies that can potentially be considered issuers of sin stocks include "for-profit prisons, predatory lenders, and companies that employ sweatshop labor."

USA Mutuals Vice Investor (VICEX)—a mutual fund whose principal investment strategy, according to its prospectus, is to invest in equity securities of companies that derive a significant portion of their revenues from a group of vice industries—includes four: alcoholic beverages, tobacco, gaming, and defense/aerospace.

Finally, we note that what is viewed as a sin stock may change over time: Companies classified as sin stocks today can have a shift in their product mix and revenue sources that results in a reclassification. For example, Anheuser Busch and Heineken have announced plans to aggressively market their nonalcoholic beer. The other way around is also possible: firms migrating from non-sin to sin as a result of changing social norms. For instance, large institutional investors are increasingly setting carbon footprint targets, effectively barring them from investing in stocks with high CO_2 emissions. It is also quite conceivable that, at some point in the future, blue-chip companies such as Coca-Cola and McDonald's will get marked as sin stocks, as sugar and fat are increasingly targeted as vices because of the obesity epidemic.

SIN STOCK PERFORMANCE STUDIES

Fabozzi, Ma, and Oliphant [2008] consider a global sample over the 1970–2007 period that covers 21 national markets. They define a sin portfolio by selecting stocks in the alcohol, tobacco, defense, biotech, gaming, and adult services industries. Their sample of sin stocks, created from a systematic process of identifying product lines and revenue breakdowns for each company, included a company only if the revenue obtained exceeded more than 30% of the company's total revenue. Each sin stock category included both direct and peripheral product/service providers. They find that sin stocks outperform the market by over 3% per annum on a raw basis, and by almost 6% per annum on a beta-adjusted basis.

Hong and Kacperczyk [2009] examine sin stocks in the United States over the period 1965–2006. They did not include in their sample adult entertainment services. They find one-, three-, and four-factor alphas of about 3% per annum and that this result is robust to extending the sample back to 1926, as well as to

considering international stock markets instead of the United States. Consistent with these two studies, Statman and Glushkov [2009] analyze sin stocks in the United States over the 1992–2007 period and find one-, three-, and four-factor alphas of 2%–3% per annum.

Salaber [2007] looks at the returns of sin stocks from the tobacco, alcohol, and gaming sectors for 18 European countries over the 1975–2006 period. He finds that sin stock returns depend on the legal and religious environments of the country in which the stocks are traded. Measuring legal environment in terms of the degree of litigation risk, Salaber finds that after adjusting for well-known factors (size and book/market), sin stocks outperform other stocks when their litigation risk is higher. As for religion, he finds that Protestants are more adverse to sin than Catholics, so in such countries, Protestants require a significant premium to induce them to invest in sin stocks.

Lobe and Walkshäusl [2016] investigate whether a global, regional, and domestic portfolio composed of sin stocks outperforms the corresponding portfolio made up of socially responsible stocks. Unlike the previous studies, they find no evidence that sin stocks outperform or underperform. What is important to note, however, is that next to commonly used sin stock sectors (adult entertainment, alcohol, gambling, tobacco, and weapons), these authors also include nuclear power. Moreover, this choice seems to dominate their conclusion, because as much as 46% of their total sin portfolio is allocated to nuclear power, while the returns of this particular sector are found to be not particularly anomalous.[5] This choice is all the more remarkable given that none of the seven other studies on sin stocks to which they refer includes nuclear power.[6]

DATA AND METHODOLOGY

Our definition of sin stocks comprises four industries that are included in almost every study on this topic and that collectively have been strongly associated with positive abnormal returns: alcohol, tobacco, gambling, and weapons. Another typical sin industry, porn, is not included in our analysis because an index for this sector is simply not available. Because this is a very small industry in the public equity markets, this will have little impact on the results. We also do not include industries that are only identified as sin in a small minority of studies, such as biotech or nuclear power.

Long-term U.S. sin stock return data are obtained using industry returns from the online data library of Kenneth French, and global sin stock return data are obtained using industry returns from Thomson Reuters Datastream. For the long-term U.S. sample, we take a market-value-weighted combination of the "beer," "smoke," and "guns" sectors in the Kenneth French database, which represent the alcohol, tobacco, and weapons sectors. Unfortunately, the gambling industry is not included here because it is not available as a separate sector. The combined weight of these sin sectors as a percentage of the total U.S. equity market varies between 1.2% and 4.9% over time, and amounts to 2.5% on average. For the global sample, we use a market value weighted average of the brewers, distillers, tobacco, gambling, and defense industries in the Thomson Reuters Datastream database. The analysis is conducted for the United States, Europe, Japan, and global developed equity markets separately. The combined weight of the sin sectors averages 2.1% for the United States, 3.5% for Europe, 1.6% for Japan, and 2.2% for global.

The performance of sin stocks is analyzed using time-series regressions. The variable on the left-hand side of these regressions is the return on sin stocks minus the corresponding market return. The explanatory variables on the right-hand side of the regressions consist of the market (Mkt-Rf), size (SMB), value (HML), momentum (WML), profitability (RMW) and investment (CMA) factors, available for the various regions in the online data library of Kenneth French. In addition, we use the low- versus high-beta BAB (betting against beta) factor of Frazzini and Pedersen [2014], obtained from the website of AQR, which also offers data for each individual region. The data frequency is monthly, all returns are total returns in U.S. dollars, and in each case the longest sample period possible is taken. This comes down to July 1963–December 2016 in the Kenneth French sample for the United States, January 1973–December 2016 in the Thomson Reuters Datastream sample for the United States, and July 1990–December 2016 in the Thomson Reuters Datastream samples for Europe, Japan, and global.

RESULTS

The results for the various samples are summarized in Exhibits 1 to 4. Exhibit 1 contains results for the U.S. market. Panel A is based on the U.S. Kenneth French

EXHIBIT 1

Time-Series Regressions of Sin Stock Minus Market Returns on Various Control Factors, United States

Panel A: July 1963–December 2016						
Alpha	0.47%	0.45%	0.40%	0.27%	0.13%	0.10%
	3.57	**3.39**	**3.00**	**2.06**	1.07	0.78
Mkt-Rf	–0.28	–0.22	–0.21	–0.22	–0.12	–0.14
	–9.32	**–7.15**	**–6.74**	**–7.22**	**–4.07**	**–4.46**
SMB		–0.18	–0.18	–0.18	–0.03	–0.05
		–3.99	**–4.01**	**–4.12**	–0.80	–1.10
HML		0.12	0.13	0.02	–0.13	–0.16
		2.44	**2.73**	0.32	**–2.13**	**–2.60**
WML			0.05	0.00	0.00	–0.02
			1.55	–0.10	–0.07	–0.73
BAB				0.27		0.12
				6.15		**2.90**
RMW					0.64	0.58
					10.90	**9.49**
CMA					0.53	0.48
					6.02	**5.39**
R-square	12.0%	14.9%	15.2%	20.0%	29.9%	30.8%
Panel B: January 1973–December 2016						
Alpha	0.48%	0.43%	0.41%	0.30%	0.07%	0.06%
	2.71	**2.42**	**2.26**	1.62	0.44	0.35
Mkt-Rf	–0.16	–0.13	–0.13	–0.14	–0.02	–0.03
	–4.23	**–3.23**	**–3.05**	**–3.26**	–0.57	–0.66
SMB		–0.06	–0.06	–0.07	0.12	0.11
		–1.08	–1.08	–1.21	**2.05**	1.92
HML		0.11	0.12	0.01	–0.20	–0.22
		1.80	1.87	0.22	**–2.59**	**–2.70**
WML			0.02	–0.03	–0.04	–0.05
			0.53	–0.66	–1.08	–1.25
BAB				0.23		0.04
				4.06		0.80
RMW					0.78	0.76
					10.33	**9.47**
CMA					0.58	0.57
					4.93	**4.80**
R-square	3.3%	4.1%	4.2%	7.1%	22.0%	22.1%
Panel C: July 1990–December 2016						
Alpha	0.55%	0.42%	0.46%	0.33%	–0.01%	–0.03%
	2.21	1.73	1.87	1.34	–0.05	–0.15
Mkt-Rf	–0.33	–0.28	–0.30	–0.27	–0.06	–0.06
	–5.77	**–4.91**	**–4.97**	**–4.47**	–0.97	–0.93
SMB		–0.03	–0.03	–0.01	0.19	0.19
		–0.39	–0.34	–0.16	**2.46**	**2.40**
HML		0.36	0.34	0.23	–0.20	–0.22
		4.51	**4.15**	**2.56**	–1.82	–1.96
WML			–0.05	–0.10	–0.11	–0.12
			–0.94	–1.82	**–2.33**	**–2.47**
BAB				0.21		0.06
				2.81		0.83
RMW					0.80	0.77
					7.61	**7.04**
CMA					0.71	0.70
					4.76	**4.68**
R-square	9.5%	15.2%	15.4%	17.5%	31.0%	31.1%

Note: Bold values represent the 5% significance level.

sample for the period July 1963–December 2016. The first regression shows that sin stocks have a one-factor alpha of 0.47% per month, which is both statistically and economically highly significant. The second and third regression show that the alpha remains highly significant after controlling for the classic size, value, and momentum factors, with a significantly positive value loading largely offset by a significantly negative size loading. These results are fully in line with the existing literature and seem to confirm the existence of a sin stock anomaly.

In all these regressions, the exposure to the market factor is strongly and significantly negative, implying that sin stocks tend to be low-beta stocks. Because many studies find evidence for a low-beta anomaly, the fourth regression additionally controls for the return difference between low- and high-beta stocks. The loading on this BAB factor turns out to be high and significant, and it renders the value factor completely insignificant. Although the alpha is reduced, it remains significant. In the fifth regression, the two new Fama–French factors, profitability and investment, are used instead. The exposure of sin stocks to these quality factors turns out to be even larger than their BAB exposure, and the R-squared of the regression increases sharply. Most importantly, however, the alpha is reduced further and becomes statistically indistinguishable from zero. In the sixth and final regression, the BAB factor and the two new Fama–French factors are allowed to compete head on. All three turn out to be significant in this case, but the Fama–French factors are clearly strongest. The alpha remains small and insignificant. In other words, the abnormal return of sin stocks is fully explained when controlling for the exposure of these stocks to low-beta, profitability, and investment factors.

In Exhibit 1, Panel B, the analysis is repeated using U.S. data from Thomson Reuters Datastream, covering the period January 1973–December 2016, and the results are very similar to those in Panel A. The one-, three-, and four-factor alphas are significant; adding the BAB factor already renders the alpha insignificant, but the two new Fama–French factors have even stronger explanatory power and completely wipe out the alpha. In Exhibit 1, Panel C, we conduct the same analysis for the period July 1990–December 2016, so that the U.S. results can be compared to those for the other regions (in the subsequent exhibits) covering the same period. The picture remains the same, although in this case

EXHIBIT 2

Time-Series Regressions of Sin Stock Minus Market Returns on Various Control Factors, Europe, July 1990–December 2016

Alpha	0.44%	0.41%	0.27%	0.14%	–0.04%	–0.09%
	2.49	**2.26**	1.46	0.77	–0.24	–0.49
Mkt-Rf	–0.34	–0.35	–0.33	–0.35	–0.23	–0.27
	–9.50	**–9.48**	**–8.58**	**–9.69**	**–5.67**	**–6.74**
SMB		0.00	0.00	–0.28	0.06	–0.16
		0.04	–0.04	**–3.13**	0.79	–1.83
HML		0.12	0.17	0.06	0.12	0.06
		1.66	**2.23**	0.82	1.14	0.59
WML			0.12	0.00	0.02	–0.05
			2.40	–0.06	0.43	–1.05
BAB				0.38		0.29
				6.14		**4.65**
RMW					0.68	0.56
					4.89	**4.04**
CMA					0.48	0.36
					3.92	**2.96**
R-square	22.2%	22.9%	24.3%	32.5%	33.2%	37.5%

Note: Bold values represent the 5% significance level.

EXHIBIT 3

Time-Series Regressions of Sin Stock Minus Market Returns on Various Control Factors, Japan, July 1990–December 2016

Alpha	0.25%	0.17%	0.17%	0.14%	0.18%	0.15%
	0.99	0.68	0.66	0.57	0.73	0.63
Mkt-Rf	–0.26	–0.26	–0.25	–0.25	–0.26	–0.25
	–6.21	**–5.91**	**–5.68**	**–5.69**	**–5.64**	**–5.66**
SMB		0.11	0.11	0.05	0.07	–0.01
		1.49	1.50	0.63	0.92	–0.09
HML		0.18	0.19	0.19	0.01	–0.01
		2.05	**2.06**	**2.07**	0.09	–0.06
WML			0.02	–0.03	0.03	–0.02
			0.35	–0.46	0.58	–0.34
BAB				0.17		0.20
				2.73		**3.16**
RMW					0.11	0.13
					0.68	0.81
CMA					0.50	0.54
					3.29	**3.62**
R-square	10.9%	12.9%	13.0%	15.0%	16.5%	19.1%

Note: Bold values represent the 5% significance level.

even the three- and four-factor alphas already lose their significance at the 95% level.

Exhibit 2 shows results for Europe. The CAPM alpha of European sin stocks is positive and significant, and the magnitude of the alpha is similar to that in the United States. In other words, at first sight there also appears to be a sin premium in Europe. The three-factor alpha remains significant, but the four-factor alpha is considerably lower and no longer significant, mainly due to a loading on the momentum factor. This momentum exposure disappears when the BAB factor is included in the regression, which turns out to be highly significant. However, in this case the alpha becomes even smaller, and it is not even close to significant anymore. When the two new Fama–French factors are added instead, the alpha even becomes negative because of highly significant loadings on both these factors. When the BAB factor and the two quality factors are jointly included, all three end up being significant but the alpha remains negative. Thus, in Europe, the sin stock anomaly is also fully resolved by considering current asset pricing factors.

Exhibit 3 shows results for Japan. Here the one-factor alpha of sin stocks, although still positive, is not even significant to begin with. When the other factors are added, the alpha shrinks further and becomes even less significant because of significant loadings on the value, BAB, and investment factors. In Japan, therefore, there is also no evidence of a sin stock anomaly.

Finally, Exhibit 4 shows results for the global sample. Given that the United States and Europe dominate the world index, it is not surprising that the global results are in line with the results for these two regions. The CAPM alpha is positive and significant, but the three-factor alpha is already insignificant at the 95% level because of a significant value loading. The alpha drops further with the addition of the BAB factor, but the two new Fama–French factors have even stronger explanatory power and render the alpha completely insignificant. In a head-to-head competition, the two new Fama–French factors dominate the BAB factor, and the alpha remains marginally negative.

Unreported tests show that the conclusions are similar for the individual sin sectors—that is, none of these sectors is able to show a significant alpha for any of the markets or sample periods we considered. Another unreported robustness test shows that it is really the Fama–French quality factors that explain the alpha of

EXHIBIT 4

Time-Series Regressions of Sin Stock Minus Market Returns on Various Control Factors, Global, July 1990–December 2016

Alpha	0.46%	0.31%	0.33%	0.22%	–0.05%	–0.06%
	2.56	1.76	1.83	1.23	–0.32	–0.37
Mkt-Rf	–0.34	–0.30	–0.31	–0.30	–0.13	–0.14
	–8.24	**–7.60**	**–7.46**	**–7.42**	**–2.92**	**–3.02**
SMB		0.00	0.00	–0.07	0.26	0.23
		–0.06	0.02	–0.79	**3.03**	**2.50**
HML		0.40	0.38	0.22	0.01	–0.02
		5.26	**4.85**	**2.51**	0.06	–0.17
WML			–0.03	–0.09	–0.10	–0.11
			–0.56	–1.85	**–2.27**	**–2.43**
BAB				0.27		0.07
				3.63		0.88
RMW					0.96	0.91
					7.38	**6.43**
CMA					0.47	0.45
					3.59	**3.44**
R-square	17.7%	24.4%	24.4%	27.5%	36.8%	36.9%

Note: Bold values represent the 5% significance level.

sin stocks and not the other way around—that is, the four-factor model augmented with a sin stock factor is not able to explain the performance of the Fama–French profitability and investment factors.

DISCUSSION

This article provides compelling evidence that the abnormally high raw returns of sin stocks can be fully explained by recently introduced asset pricing factors—in particular, the two new quality factors of Fama and French [2015], profitability and investment. After controlling for exposures to these factors, we find no evidence of the existence of a premium that pertains specifically to sin stocks, such as a reward for bearing the reputation risk involved with these stocks. In other words, there is nothing mysterious about the performance of sin stocks: it is exactly what one would expect based on their exposure to factors that are included in current asset pricing models. Thus, the sin stock anomaly is resolved.

Many investors have an exclusion policy that does not allow investments in sin stocks. Our finding that there is no sin stock anomaly does not imply that such an exclusion policy has no effects on performance. As long as sin stocks have positive exposures to factors that are rewarded with positive premiums, such as the Fama–French quality factors, their raw expected return remains higher than that of the market, and therefore excluding these stocks will have a negative impact on raw expected portfolio return.

However, now that it is clear where this performance loss is coming from, it is also clear what investors may do about this. Given that we can trace the outperformance of sin stocks to exposures to certain factors, investors may restore their portfolios' expected return by making sure that the portfolios' factor exposures do not deteriorate when excluding sin stocks. For example, investors could increase the weights of stocks that are able to compensate for the loss in factor exposures that results from excluding sin stocks—that is, by investing more in non-sin stocks that have exposures to the same factors that drive sin stock returns.

ENDNOTES

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[1]Examples include the Whiskey ETF that invests in companies involved with the distillation of spirits and the VanECK Vectors Gaming ETF that tracks casinos. There is one mutual fund that invests across all subcategories of sin stocks, USA Mutuals Vice Investor.

[2]For a further discussion of what is referred to more generally as the *shunned-stock hypothesis*, see Derwall, Koedijk, and ter Horst [2011].

[3]See www.investopedia.com/terms/s/sinfulstock.asp.

[4]See sinstocksreport.com/category/sin-stocks.

[5]Table 5 of their article shows that nuclear power has a much lower CAPM alpha than the alcohol, tobacco, and weapons subcategories, which weakens their findings. It is also interesting to note that their sample consists of 755 sin stocks, while our sample only has 100. Perhaps this is because they also include microcaps or because they use a less strict sector definition (e.g., they include stocks of companies that are just partly involved with sin activities), which would also explain their weaker results.

[6]We are aware of one other study that includes nuclear power, Statman and Glushkov [2009], but in their case it does not seem to have a material effect on the conclusions.

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