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Industry Cycles and the Performance of Buyout Funds

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Abstract

The current economic recession is the most severe downturn since the Great Depression. While virtually all sectors and industries have been affected, some industries have been affected substantially more than others. Industries behave differently not only in recessions, but also over the entire business cycle. As this paper shows, industry cycles are reflected in the performance of buyout funds. Timing the cycle correctly is found to be an important performance driver. Specifically, the paper finds that buyout funds are unlikely to be in the top quartile, unless they have invested in the right industry at the right time of the cycle. Although market timing is a sufficient, but not a necessary condition for outperformance, our findings have important implications for the due diligence efforts of Limited Partners. Furthermore, the results are relevant for Limited Partners with a well-diversified primary fund program, who may choose to construct a more concentrated co-investment portfolio, selecting industries they expect to have above-average upside potential. Finally, Limited Partners may employ their industry-specific expertise in valuating portfolios in the secondary market.

I. Introduction

The financial turmoil, which began in the summer of 2007, has caused the most severe economic downturn since the Great Depression. No country has been immune: In the advanced economies, unemployment has risen sharply due to the substantial contraction of economic activity. In the emerging markets, economic growth has slowed progressively, with world trade falling at alarming rates. Global financial markets have remained largely dysfunctional, despite massive policy measures around the globe. With banks being unable or unwilling to lend, the volume of global buyouts has declined to a level last seen in 2001. In fact, in the final quarter of 2008, the volume of global transactions is estimated to have fallen to less than US\$20bn, an amount that would have been insufficient to qualify for a top-ten mega deal in the golden age of private equity in 2006 and the first half of 2007. Meanwhile, fundraising has also slowed progressively. Despite substantial mark-to-market losses of portfolio companies, many investors found themselves over-exposed to private equity relative to their allocation targets, a “denominator effect” that has been compounded by the sharp decline in distributions.

The current economic downturn has affected virtually all sectors and industries. However, some industries have been affected substantially more than others. Banks, construction-related industries and consumer discretionary have been hit particularly hard, with their public valuations having fallen by 70 to 90% between the onset of the crisis in mid-2007 and March 2009 compared with the decline in the MSCI World Index by around 55%. By contrast, healthcare, consumer staples and utilities have proven to be relatively more resilient, as they have been in previous downturns.

Industries behave differently not only in recessions, but also over the entire business cycle. In Table 1, we show correlation coefficients of total returns in individual U.S. industries for the period from 1970 to 2008. In several cases, we find that total returns are highly correlated, for example in the household goods sector relative to the automotive industry (92.0%); clothing relative to retail (91.8%); or building materials relative to construction (88.3%). However, in other cases correlations are considerably lower, for instance in the publishing industry relative to pharmaceuticals (43.2%); utilities versus health care (46.4%) or versus computers (28.1%). As different industries are imperfectly correlated, this suggests that there exist potential diversification benefits.

However, investors may decide to deviate from a well-diversified portfolio and concentrate on industries where they possess informational advantages. As far as actively managed equity mutual funds are concerned, recent academic research finds that, on average, more concentrated funds actually perform better, after controlling for risk and style differences (Kacperczuk et al., 2005). More specifically, analyzing the buy and sell decisions of mutual funds, this research finds that managers of mutual funds with concentrated industry portfolios tend to be better at timing the market, with trades of concentrated portfolios adding more value than the trades of diversified portfolios.

In the private equity industry, the majority of private equity firms restricts their investment universe to a limited number of industries and is organized accordingly. This industry-focused organization aims to ensure that informational advantages are accumulated, which GPs seek to exploit in identifying assets, whose value can be enhanced through a combination of operational improvements and financial engineering. Whether these informational advantages are also used successfully to time industry cycles is an open question, however. While a substantial amount of academic research has focused on the importance of financial, governance, and operational engineering for the value creation in private equity (Kaplan and Strömberg, 2009), much less has been said about private equity returns stemming from market timing and multiple arbitrage.

In aiming to shed some light on this question, we start by briefly reviewing vintage year returns in individual industries. Then, we discuss the extent to which buyout funds are diversified

across sectors in terms of the capital they have deployed. Further, we examine the degree to which the industry concentration of individual buyout funds and their performance are interrelated. Finally, we focus on the role of market/industry timing. Have funds with superior returns achieved their outperformance exclusively or largely because of their extraordinary operational and financial engineering skills? Or have they outperformed at least in part because they picked the right industry at the right point in time?

II. Industry Cycles and Vintage Year Returns

Since individual industries follow their own dynamics, at least to a certain degree, one would expect significant differences in the vintage year performance of private equity transactions across sectors. This is exactly what we find. In Table 2, we present dollar-weighted IRRs for 7,098 portfolio companies acquired by U.S. private equity funds between 1995 and 2006. Compiled by Cambridge Associates, these IRRs refer to the pooled gross mean of companies receiving initial investment in individual years. Overall, the data confirm the already well-known inverse relationship between vintage year performance and the business cycle: investments made in the final stages of the business cycle tend to underperform as too much capital is chasing too few deals, whereas acquisitions made in the early stages of the business cycle tend to outperform as purchase prices are still low and earnings begin to recover. From an Limited Partner's perspective, the best funds tend to be therefore those that are raised in recession years.

As far as individual industries are concerned, many follow a similar pattern in the sense that their vintage year performance deteriorates as the business cycle matures and improves as real economic activity picks up again. This is, for example, the case in the consumer goods and retail industries. However, in some cases performance swings tend to be significantly more pronounced than the overall return cycle. Take chemicals, for instance: In the second half of the 1990s, its performance worsened significantly more than the average performance of buyouts, whereas it led the recovery in the upswing between 2002 and 2005. Similarly, gross returns in manufacturing underperformed in the more mature phases of the 1990s cycle, but increased more or less in line with the overall market. By contrast, some industries appear to be less susceptible to the business cycle in terms of their vintage year performance. For example, gross IRRs in healthcare show comparatively less variance across different vintage years.

Overall, we find that individual industries differ considerably in terms of the variance of their performance. While in some industries – e.g. chemicals, energy, or telecom products – gross IRRs vary substantially across different vintage years, in others returns are comparatively steadier. Importantly, however, private equity investors in individual industries get compensated for higher risk: Those industries that show the greatest variability of returns across vintage years tend to have the highest average returns.

III. Industry Specialization and Portfolio Concentration

Other things being equal, the broader the industry portfolio of a private equity firm, the more flexible the fund manager is in deploying capital across individual industry cycles. Conversely, General Partners, who are specialized in a limited number of industries, are more constrained in re-allocating capital to industries where the cycle appears to be comparatively more promising. Specialized funds may thus be subject to considerably greater fluctuations in their investment volume – or performance – over time.

Table 1. Correlation Coefficients for Total Annual Returns in Individual U.S. Industries, 1970 - 2008

	Entertain	Books	Hshld	Clths	Hlth	MedEq	Pharma	Chems	Rubber	Txtls	BldMt	Cnstr	Steel	FabPr	Machinery	ElcEq	Autos	Mines	Coal	Oil	Util	Telcm	BusSv	Comps	Semis	Paper	Trans	Whlsl	Rtail	Restaur	Banks	Insur	Fin						
Entertain	100.0%																																						
Books		100.0%																																					
Hshld			100.0%																																				
Clths				100.0%																																			
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Rubber									100.0%																														
Txtls										100.0%																													
BldMt											100.0%																												
Cnstr												100.0%																											
Steel													100.0%																										
FabPr														100.0%																									
Machinery															100.0%																								
ElcEq																100.0%																							
Autos																	100.0%																						
Mines																		100.0%																					
Coal																			100.0%																				
Oil																				100.0%																			
Util																					100.0%																		
Telcm																						100.0%																	
BusSv																							100.0%																
Comps																								100.0%															
Semis																									100.0%														
Paper																										100.0%													
Trans																											100.0%												
Whlsl																												100.0%											
Rtail																													100.0%										
Restaur																														100.0%									
Banks																															100.0%								
Insur																																100.0%							
Fin																																		100.0%					

Source: Fama and French

Table 2. U.S. Buyout Dollar-Weighted IRR on Vintage Year Companies (as of September 30, 2008)

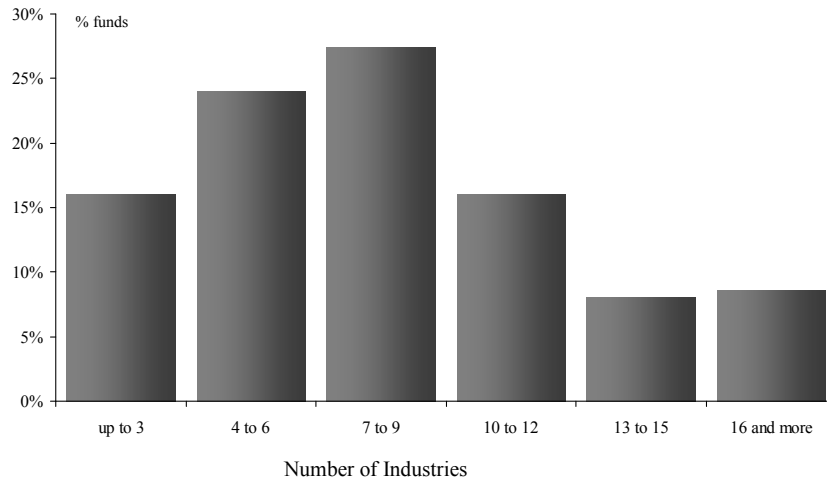
Pooled Gross Mean of Companies Receiving Initial Investment in:

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	Avg	Standard deviation
Chemicals	153.56	-19.49	-2.42	-9.57	-4.02	9.88	30.32	26.69	55.30	136.31	32.82	0.72	34.17	56.01
Consumer/retail	29.29	12.02	11.49	9.74	4.92	24.85	31.24	39.76	29.72	31.24	14.55	12.36	20.93	11.26
Electronics	26.66	34.93	30.18	-43.90	15.45	0.82	86.31	26.43	21.92	42.25	13.30	-23.85	19.21	32.68
Energy	16.06	17.17	20.10	21.13	12.64	25.94	31.23	65.26	78.82	154.42	54.06	11.01	42.32	41.65
Financial services	-2.93	60.26	1.04	31.09	0.54	20.30	26.36	22.73	-1.37	16.44	31.96	1.79	12.34	18.86
Hardware/systems	67.13	-0.18	16.46	-3.53	78.98	38.68	30.69	609.76	...	5.93	23.25	100.13	84.95	177.91
Health care	10.33	9.51	20.30	19.35	19.47	18.05	16.80	43.59	31.84	28.96	24.97	7.61	20.91	10.29
o/w pharmaceuticals	43.64	59.30	56.70	27.64	26.56	41.11	1.96	63.76	1.67	2.60	23.73	55.60	33.69	23.18
Industrial	16.32	89.63	7.07	6.08	30.32	17.39	42.52	14.80	28.37	26.37	33.49	17.26	27.48	22.36
Information technology	62.29	43.00	98.06	14.24	1.75	-8.06	10.92	10.93	40.09	92.92	34.66	-1.30	33.29	35.67
o/w Telecom systems	92.57	39.84	72.89	14.07	30.51	-2.65	8.41	20.36	18.42	68.07	2.46	-15.11	29.15	33.16
o/w Telecom products	26.65	6.37	100.50	15.98	-6.51	-10.91	18.47	13.46	53.21	105.71	151.29	43.80	43.17	50.67
Manufacturing	24.08	0.56	14.60	6.69	10.21	-0.06	-0.62	23.97	40.07	26.68	32.41	17.23	16.33	13.44
Media	52.30	37.94	15.19	2.57	4.52	-2.97	10.31	40.50	36.30	13.72	34.57	8.44	21.11	18.12
Software/services	17.09	45.44	96.88	20.28	8.93	-0.11	26.50	47.11	36.67	31.19	15.63	22.29	30.66	25.11
All firms	37.50	17.61	27.42	12.69	7.39	7.36	22.45	35.09	38.27	44.21	28.35	7.05	23.78	13.34
Real GDP Growth	2.5	3.7	4.5	4.2	4.5	3.7	0.8	1.6	2.5	3.6	2.9	2.8	3.1	1.15
Number of firms	281	358	468	538	785	1,155	425	395	488	635	724	845	553	...

Source: Cambridge Associates, authors' calculations

Examining the industry focus of 131 individual European and U.S. buyout funds raised between 1997 and 2006, we find that most of them are relatively diversified across industries. As shown in Figure 1, one-third of the funds have made investments in at least 10 different industries, while another 28% of the funds are diversified across at least 7 industries.¹ However, capital is not deployed equally across different industries. In several cases, a significant share of the fund’s capital is absorbed by just one sector – in some extreme cases even more than 50%. This is reflected in the Hirschman-Herfindahl (HH) index, which is defined as $\sum S_i^2$, with S_i denoting the share of the i th industry in a buyout fund. If the entire capital of a fund is deployed in just one industry, the index reaches its maximum value of 10,000 (100^2). Consider two examples: Fund 1 invests in ten different industries, whereby eight industries absorb equal shares of 10% of the fund’s capital, one industry absorbs 15% of the capital, and one industry receives 5%. Fund 2 invests 50% of its capital in one industry, 10% in another industry and divides the remaining 40% in equal parts of 5% across eight industries. While the HH index is 1,050 for Fund 1 ($8*10^2 + 1*15^2 + 1*5^2$), it is 2,800 for Fund 2 ($1*50^2 + 1*10^2 + 8*5^2$). As Figure 2 shows, almost 50% of the funds in our sample have a HH index value of more than 1,800, which is generally considered as an indicator for the presence of concentration. Interestingly, fund size does not seem to play a role – in fact large funds are as concentrated across industries as smaller funds.

Figure 1. Number of Industries in Buyout Funds



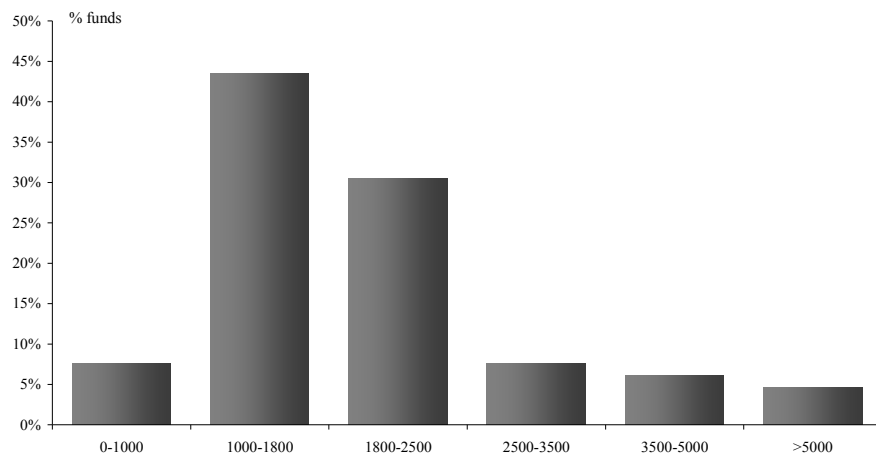
Source: AlpInvest Research

The significant concentration of buyout funds suggests that many GPs are specialized in a limited number of industries. In fact, some of them focus on a very narrow set of sometimes closely correlated industries, seeking to exploit informational advantages in identifying assets with superior value potential and unleashing this potential through a combination of financial leverage, operational improvements, and multiple arbitrage. Acquiring superior expertise in

¹ Based on 2-digit industries following the North American Industry Classification System (NAICS). Manufacturing is disaggregated at the 3-digit level.

particular industries is costly, however, and changes in a General Partner’s industry focus are made relatively infrequently, normally mirroring secular shifts in the structure of the national or global economies. Examples of such structural shifts include the software and internet industries, hotels and restaurants, healthcare services, business services, education, and infrastructure, whose shares in the buyout market in period from 2000 to 2007 at least doubled compared with the 1970s and 1980s, albeit from a low level. The expansion of these industries has mainly come at the expense of retail, chemicals, industrial materials, and household durables (Strömberg, 2008).

Figure 2. Industry Concentration in Buyout Funds Measured by Herfindahl Index



Source: AlpInvest Research

Not all funds are concentrated, however, and we find a considerable degree of variation across our sample. Is there any relationship between a fund’s concentration in terms of the industries the fund manager invests in and the fund’s performance? A priori, there are two competing hypotheses: First, more concentrated funds are more specialized and possess particular informational advantages due to their specialization. As a result, they are more likely to outperform generalist funds. Alternatively, a higher degree of concentration limits a fund’s flexibility to invest in different industries as a function of the business cycle. Thus, more concentrated funds may be more likely to underperform.

We find virtually no support for either hypothesis. In fact, the degree of concentration appears to be largely uncorrelated with the performance of the funds in our sample. When we rank funds according to the extent to which they are concentrated with regard to different industries and rank them according to their performance (IRRs or money multiples), we obtain a Spearman rank correlation coefficient of -0.08 (with a t-statistic of -0.92).²

² The Spearman rank correlation coefficient range from -1 (perfect inverse correlation of ranks) to 1 (perfect correlation of ranks).

IV. Getting the Industry Cycle Right

That industry concentration and specialization appear to have virtually no impact on the performance of buyout funds could lie in the fact that most private equity firms have dedicated industry teams, regardless of the number of industries they include in their investment universe. Interestingly, recent academic research on the specialization in the U.S. venture capital industry finds that specialist U.S. venture capital firms, which typically have more concentrated portfolios, tend to outperform generalist firms (Gompers et al., 2006). However, this research also finds that performance differentials between specialist and generalist venture capital firms largely disappear to the extent that the latter comprise of specialists.

Our findings for private equity funds are different from academic research about actively managed equity mutual funds whose performance is found to be positively related to the degree of industry specialization of funds and the superior timing of buy-and-sell decisions. While industry concentration and specialization in private equity does not appear to be a significant differentiator in terms of returns, and hence is unlikely to be a factor for buyout funds in timing the industry cycle, this does not necessarily mean that market timing as such is irrelevant in private equity. In the following, we therefore ask to what extent buyout funds with superior returns have outperformed because of their extraordinary operational and financial engineering skills as opposed to picking the right industry at the right point in time.

In order to shed light on this question, we divide our sample into U.S. and non-US funds, as there is no industry-specific performance benchmark for the latter. Our U.S. sample includes 46 buyout funds, which were raised between 1996 and 2006, with at least 70 percent of their capital invested by the end of the third quarter of 2008. In a first step, we benchmark these funds against the Cambridge Associates data, which we assume to be representative of the market. Given their portfolio of companies in specific industries acquired in particular vintage years, we estimate how the funds in our sample should have performed on a dollar-weighted basis, other things being equal. Suppose, for example, a fund had invested 20% of its capital in chemical companies in 2001, 15% in electronic companies in 2002, 10% in consumer companies in 2001 and 15% in the same industry in 2002, 15% in pharmaceuticals in 2002, 10% in industrials in 2003, and 15% in manufacturing in 2003. Gross of fees, we would have expected the fund to have achieved $(0.2*30.32\% + 0.15*26.43\% + 0.1*31.24\% + 0.15*39.76\% + 0.15*63.76\% + 0.1*28.37\% + 0.15*40.07\%)$ an IRR of 37.53%.

In a second step, we ignore individual industries and focus only on the fund's expected returns, given the vintage years of the individual acquisitions the fund has made. In our example, the fund has deployed 30% of its capital in 2001, 45% in 2002 and 25% in 2003. Benchmarked against Cambridge Associates performance data, the fund would have been expected to return (gross of fees) 32.09%. We interpret the difference between the fund's industry-weighted and industry-neutral performance as excess returns. In our example, our fund actually achieves positive excess returns, which would suggest that the fund manager was able to enhance his performance by betting on the industry cycle. Conversely, in the case of negative excess returns, a fund manager would have chosen underperforming industries, given the timing of his investment decisions.

Next, we split our sample of U.S. funds as follows: Using the Cambridge Associates dataset as our benchmark for net-of-fees fund returns, our sample includes 10 upper-quartile funds, with mean excess returns of 4.38%. Furthermore, we identify 17 second-quartile funds, whose mean excess returns are 0.68%. Our 12 third-quartile funds and 7 lower-quartile funds have negative excess returns of -1.07% and -1.50%, respectively.

Given the distribution of our sample, we employ the Wilcoxon Signed-Rank Test to determine whether the mean excess returns in each individual quartile are statistically significantly different from zero.³ Our test hypotheses are as follows:

$$H_0: \mu_{\text{sample}} = 0$$

$$H_A: \mu_{\text{sample}} > 0, \text{ if mean excess return of the sample is larger than zero, otherwise}$$

$$H_A: \mu_{\text{sample}} < 0$$

We summarize our findings in Table 3. Within the 95% confidence interval, we can reject the null hypothesis that mean excess returns of upper quartile funds are equal from zero. This implies that their outperformance was at least in part due to their ability to invest in industries at an advantageous stage of the cycle. Conversely, we cannot reject the null hypothesis for the remaining quartiles at standard levels of confidence.

Table 3. Wilcoxon Signed-Rank Test Results

Sample	Mean Excess Return	Number of Funds	P-Value	Reject H_0 ?	Confidence level for Rejection
Upper Quartile (UQ)	4.38%	10	0.0322	Yes	5%
Second Quartile (SQ)	0.68%	17	> 0.1	No	-
Third Quartile (TQ)	-1.07%	12	> 0.1	No	-
Lower Quartile (LQ)	-1.50%	7	> 0.1	No	-
UQ + SQ	2.05%	27	> 0.1	No	-
TQ + LQ	-1.23%	19	> 0.1	No	-
UQ + SQ + TQ	1.09%	39	> 0.1	No	-
SQ + TQ + LQ	-0.33%	36	> 0.1	No	-

Finally, we employ the Wilcoxon Rank Sum Test to determine whether the mean excess returns of the funds in individual quartiles are different from mean excess returns in other quartiles (or combinations of them). Specifically, we test:

³ The Wilcoxon Signed-Rank test is a non-parametric statistical hypothesis test, which can be used for the case of two related samples or repeated measurements on a single sample. The Wilcoxon test represents an alternative to the paired Student's t-test when the sample cannot be assumed to be normally distributed. The

null hypothesis tested is $H_0: \theta = 0$. The Wilcoxon signed rank statistic W_+ is defined as $W_+ = \sum_{i=1}^n \varphi_i R_i$

It is computed by ordering the absolute values $|Z_1|, \dots, |Z_n|$, with the rank of each ordered $|Z_i|$ given a rank of R_i . and $I(\cdot)$ denoting an indicator function.

Note that our tests are one-sided, assuming that the mean excess return is indicative of the sign of the actual distribution mean.

$$H_0: \mu_{\text{sampleA}} = \mu_{\text{sampleB}}$$

$$H_A: \mu_{\text{sampleA}} > \mu_{\text{sampleB}} \quad \text{where sample A consists of higher quartiles}$$

Our results are shown in Table 4. We find that the mean excess returns of our upper quartile funds are significantly different from the sample including all other funds, with the null hypothesis rejected at the 5% level of confidence. If we combine upper and second quartile funds, we can still reject the null hypothesis with respect to all remaining funds in our sample at the 10% level of confidence.

Table 4. Wilcoxon Rank Sum Test

Sample A	Sample B	P-Value	Reject H_0 ?	Confidence Level for Rejection
Upper Quartile	Second Quartile + Third Quartile + Lower Quartile	0.0331	Yes	5%
Upper Quartile + Second Quartile	Third Quartile + Lower Quartile	0.0529	Yes	10%
Upper Quartile + Second Quartile + Third Quartile	Lower Quartile	> 0.1	No	-

Overall, our results suggest that upper-quartile funds have been able to choose industries at a stage of a cycle, whose dynamics have supported the funds' performance. Conversely, funds whose performance puts them in the second, third or lower quartiles, have chosen to invest in industries whose stage in the cycle was less conducive to good buyout returns. Whether or not the significant excess returns of upper and second quartile funds can be attributed to investment skills or just luck remains an open question, however. Unfortunately, our sample is too small to examine whether excess returns are persistent. However, in the few cases in our sample where we have at least two funds raised by the same GP, excess returns vary considerably and frequently have opposite signs. Thus, while betting on the industry cycle is found to be an important return driver, it may not be the most critical one. Non-cyclical factors, notably operational improvements and financial engineering, appear to play a comparatively more important role.

V. Investment Decisions

In their due diligence work, Limited Partners typically focus on the past performance of a fund and the persistence of returns. Generally, a fund's risk-adjusted returns are scrutinized with a view to a General Partner's skills to identify underperforming assets and generate value through a combination of operational improvements and financial engineering. Industry selection normally enters the process only to the extent that excessive industry concentration is seen as potentially risky. From a Limited Partner's risk management standpoint, the limited degree of diversification

of buyout funds on a dollar-weighted basis should not cause too much worry, however, as long as funds include industries that produce relatively stable and predictable cash flows, such as tobacco, food and beverages, healthcare and utilities. While the risk-mitigating effects of including defensive industries are sometimes offset by comparatively higher degrees of leverage in such deals, most Limited Partners invest in a number of buyout funds so that their portfolios are usually well diversified across industries, even if an individual fund's portfolio of companies is not. Beyond this, a fund manager's ability to time the industry cycle appears to be of secondary importance from a due diligence standpoint.

In this article, we find evidence that the timing of the industry cycle in investment decisions is an important factor in creating value. U.S. buyout funds, which have outperformed their peers, are found to have done so in part because they picked the right industries at the right point in the cycle. On average, their operational and financial engineering skills alone would have been insufficient to produce top-quartile returns. The opposite is of course also true: While the tide lifts all boats, market timing alone would have been insufficient to catapult the buyout fund manager into the top-quartile. Thus, we may consider the timing of the industry cycle as a sufficient, but not as a necessary condition for superior returns. Whether fund managers who got the timing right in the past had particular skills or just sheer luck is a question for future research. Nevertheless, LPs are well advised to look carefully at a General Partner's market timing performance as an integral part of their due diligence process.

Industry-specific knowledge matters even more for Limited Partners who commit capital not only to primary funds, but are also active as co-investors and in the secondary fund market. First of all, Limited Partners with a well-diversified primary fund program may choose to construct a more concentrated co-investment portfolio, selecting industries they expect to have above-average upside potential given the stage of the cycle. Second, Limited Partners may employ their industry-specific expertise in valuating portfolios in the secondary market. Given that individual industry cycles are not fully aligned with the overall business cycle, but may lead or lag a downturn as well as an economic recovery, this knowledge should produce superior results compared with the cruder but popular approach of using GDP growth as a proxy for the earnings outlook for companies in a secondary portfolio.

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