Law of One Price Violation in Parent-Subsidiary Relations

Anne-Marie Anderson*
Middle Tennessee State University
Murfreesboro, TN 37132
(615) 898-2520
anne.anderson@mtsu.edu

Benjamin Jansen
Middle Tennessee State University
Murfreesboro, TN 37132
(615) 898-2520
benjamin.jansen@mtsu.edu

Abstract

We present evidence of a persistent violation of the law of one price in the U.S. stock market. Using a hand collected dataset which corrects for the data errors in SDC, we find that the value of the parent's ownership in the subsidiary can exceed the parent firm's total market value consistent with prior literature. Contrary to what efficient capital markets would suggest, this price aberration is persistent, and we show that it is possible to profitably trade by taking advantage of the price discrepancy.

Keywords: Asset Pricing (G12); Market efficiency (G14); Firm Value (G32)

* Corresponding author

1. Introduction

The Law of One Price (LOP) is a central to financial economics. If two assets generate the same cash flows, then they should have the same price. However, LOP is empirically difficult to verify because it is impossible to know what future cash flows will be. Our paper studies a special case in which violations of LOP may be observed in the relative market values of parent firms and their holdings in subsidiary firms. A parent firm should be at least as valuable as the value of its holdings in a subsidiary in a LOP consistent valuation. Our paper identifies clear and persistent violations of LOP beyond the narrower contexts in which academics first noticed them in U.S. securities markets.

Prior research had identified potential violations of LOP through equity carve-outs where the parent firm has a lower market value than the value of their holdings in the subsidiary firm they carved-out (Schill and Zhou (2001), Mitchell, Pulvino, and Stafford (2002), Lamont and Thaler (2003), and Bayar, Chemmanur, and Liu (2011)). However, these studies focused on tech stocks during the late 90s Tech Bubble. They generally conclude that the negative stub values, where the parent firm's value is lower than the value of their holdings in their subsidiary, are a statistical artifact of that time period and industry. Furthermore, they suggested trading constraints would prevent investors from profiting on these pricing discrepancies.

Our paper contributes to the literature in two ways. First, our paper presents evidence that LOP does not always hold in securities markets and that LOP violations are considerably more common than earlier papers suggest. Second, we show that investors may earn a profit by buying the subsidiary and shorting the parent firm in negative stub firms.

2. Literature Review

Schipper and Smith (1986) find evidence that carve-outs result in a positive average return surrounding the carve-out date. This suggests that carve-outs may be a viable alternative to SEOs, which typically result in a negative announcement return. Michaely & Shaw (1995) show that divestitures result in poor returns relative to the market. However, Vijh (1999, 2002) finds evidence that carve-outs do not underperform relative to IPOs. Vijh (1999) suggests this result stems from markets reacting efficiently to the expected future performance of the carved-out firms.

Schill and Zhou (2001) and Lamont and Thaler (2003) find evidence of negative stub values related to carve-outs in the tech industry during the Tech Bubble in the late 1990s. However, their results suggest that the negative stub values exist in market conditions where trading frictions result in no tradable or profitable pricing discrepancies. They suggest that we should not observe negative stub values outside of these trading constraints. Mitchell, Pulvino, and Stafford (2002) find evidence outside the tech bubble that negative stubs exist. However, they also conclude that arbitrage is limited.

The LOP suggests that the value of the parent firm should be at least as high as the value of their holdings in any of their subsidiaries. If ownership in subsidiaries is valued higher than the parent firm and investors may trade on this valuation discrepancy. Prior research postulates that negative stub values are constrained to certain industries and during periods of euphoric valuations, such as with tech firms during the 90s Tech Bubble. We examine whether the valuation discrepancies are constrained to tech firms during the late 1990s.

In addition, if there are negative stub values present and the LOP holds, we should find that the returns of parents relative to subsidiaries moves in such a way as to negate the existence of the negative stub. In other words, if there is a negative stub value present then the parent's returns should be relatively higher than the subsidiaries to cancel out that valuation differential. We should

expect this negative stub reversal to take place within the lock-up period to ensure that the negative stub value ends when investors could profitably trade on the valuation discrepancy. Additionally, if stub values are negative, trading constraints may not allow investors to profitably trade on the pricing discrepancy. This will maintain functionally efficient markets. Therefore, we additionally test whether any negative stub values are present only in firms with trading restrictions over the period in which the ownership in the subsidiary is valued higher than the parent.

3. Data, Summary Statistics, and Nonparametric Tests

We gather data from 1996 through 2019. Stock market data are from CRSP. Financial statement data are from Compustat. Prior research[1] has found differences in data between the SDC database and the data directly collected from SEC filings; therefore, we use hand-collected ownership data from SEC filings. Share float and trading restraint information are also gathered from SEC filings. The final sample consists of 130 parent-subsidiary matches with an average subsidiary market value of $2.81 billion and an average parent market value of $29.90 billion.

We define stub value as:

$$STUB\ VALUE = \frac{(Parent\ Size - \%\ Holdings\ In\ Subsidiary * Subsidary\ Size)}{Parent\ Size}$$

where Size is the market capitalization of the firm and equal to the closing price times number of shares outstanding.[2] If the LOP holds, then there should be no negative STUB VALUE.

3.2. Summary Statistics

Table 1 presents the 41 parent-subsidiary combinations in our sample that have a negative stub at any point in our sample. Approximately 30% of these firms had a negative stub at the time

---

[1] See Anderson and Brockman (2018)

[2] All results using this measure are consistent with those using variations of the measure for stub value used in prior research. Those measure include: (Parent Price- (%Holdings in Subsidiary*Subsidiary Price))/Parent Price, Subsidiary Size/Parent Size, and (%Holdings in Subsidiary*Subsidiary Size)/Parent Size.

of the carve-out. In addition, the number of days a negative stub occurred was between one and 2,853 with an average of 38.2% days with a negative stub.[3]

<div style="text-align: center;">(Insert Table 1 about here)</div>

Table 2 Panel A presents a breakdown of parent subsidiary combinations by industry. In our sample, 62% of the carve-outs occur with parent and subsidiary firm in the same industry and when non-operating firms are excluded this value increases to 73%. This may suggest that, while the subsidiary may not function well within the parent firm's overall structure, the subsidiary is still similar to the parent firm. Furthermore, in untabulated results there is higher proportion of same industry carve-outs with negative stub values. These results are contrary to what previous studies suggested in that negative stubs may appear due to limited information of the subsidiary.

In addition, negative stubs are present in all years in the sample as shown in Panel B of Table 2. While the largest number of firms in a single year is within the internet boom time period and results suggest that there are more negative stub valued firms during this time, we find that firms with negative stub values continue to exist after the internet boom.

Table 2 panel C provides the stub values for firms in the full sample, at carve-out, inside/outside the lock-up period, for firms with/without a planned follow-on spinoff, and firms with the parent and subsidiary in the same/different industry. In all sub-samples we find the presence of negative stubs. We find in the full sample that approximately 12.5% of the daily STUB VALUEs are negative. In the subsamples, the percentage of negative stubs ranges from 9.0% (within the lock-up subsample) to 15.8% (in the planned spinoff subsample).

---

[3] The Appendix provides the subsidiary-parent combinations that have no negative stubs.

If negative stubs only occurred when it would be difficult for most investors to trade on the price discrepancy, then we should not expect to find any negative stub values outside the lock-up period. We find evidence of negative stub values both at the time of the carve-out and outside the lock-up period post carve-out.

(Insert Table 2 here)

Although we have presented evidence of negative stub values, it may be that the LOP holds if we find that the returns of parents are higher relative to subsidiaries which would result in the negative stub valuation diminishing over time. Furthermore, this rebalancing of the relative firm values should occur within the lock-up period. It may also be possible that there is not enough float for an investor to profitability trade when negative stub value exists.

Table 3 presents average returns of parents and subsidiaries with positive and negative stubs. Contrary to what would be suggested by the LOP, we find that subsidiaries with a negative stub earn higher relative returns than their parents both within and outside the lock-up period. This suggests that not only are the parent and subsidiary prices not moving towards an equilibrium price relationship which would satisfy the LOP, but that the prices continue to hold the negative stub valuation. We also find that this relationship exists for both high and low float firms. Furthermore, we find that for firms that have a positive stub value, there is generally no significant difference in returns for parents and subsidiaries. This suggests that firms with LOP abiding valuations continue to hold that valuation.

(Insert Table 3 about here)

Table 4 presents regressions of daily parent returns on daily subsidiary returns, where subsidiary returns are weighted by the subsidiary's market cap divided by the parent's market cap. Panel A shows firm level return regression results for the full sample, firms with/without negative

stubs, firms with/without planned spinoffs, and observations where the parent firm is in the same/different industry as the subsidiary firm. We find that the parent's returns are positively and significantly associated with the subsidiary's returns. Furthermore, the positive association is stronger for negative stubs than for positive stubs. These results suggest the prices in a negative stub do not unwind the LOP inconsistent valuations. This finding is incongruous to what is predicted by the LOP.

(Insert Table 4 about here)

Based on prior research, the profitable trading strategy for negative stub parent subsidiary combinations would be to invest by shorting the subsidiary and taking a long position in the parent. Contrary to prior research, our results suggest that an investor can take advantage of the violations of LOP by investing long in the subsidiary and shorting the parent firm during the period in which the negative stub exists.

To further understand these results, Table 5 Panel A presents portfolio regressions where portfolios are composed of long-subsidiary and short-parent returns across positive and negative stubs. These long-short portfolios are regressed on the Fama-French factors. Results suggest that portfolios of positive stubbed firms long the subsidiary and short the parent have insignificant alphas. However, even after controlling for the Fama-French factors, portfolios of negative stubbed firms long the subsidiary and short the parent have significantly positive alphas.

One concern discussed in the literature with regard to profitably of trading on the pricing discrepancy is related to float in the subsidiary. Float is defined as one minus the percent of the carved-out firm held by the parent. We create portfolios sorted across the float median in to high and low float. Panel B of Table 5 shows that our trading strategy results in an average daily return of 0.16% (47.85% annualized return) for low float firms and 0.23% (78.71% annualized return) for

high float firms. These results suggest investors may profit from the LOP pricing discrepancy we identify.

(Insert Table 5 here)

Figure 1 shows the results of investing following this strategy of going long the subsidiary and short the parent using three different portfolios. First, investing in a portfolio using the full sample, we find that $1 invested for 180 days would grow to $2.29. Second, if we exclude firms that were carved-out during the internet boom, a $1 investment would grow to $2.10. Finally, using the sample of firms with a negative stub at carve-out a $1 investment would grow to $1.13.

(Insert Figure 1 here)

4. Conclusion

We study parent carve-outs of subsidiaries and examine whether the stub value resulting from this carve-out is in line with the LOP. If markets are efficient and the LOP reflects market conditions, then the parent firm's market value should be at least as large as the value of their holdings in their subsidiary at the time when investors can trade on this pricing discrepancy. However, we find evidence which is contrary to the LOP: carve-outs with subsidiary holding valuations greater than their parent valuations do exist, and furthermore, they are present past the lock-up period around the carve-out. These results hold across the entire sample period and across industries. Even more incongruent with an efficient capital market, we find evidence that when the market value of the holding in the subsidiary exceeds its parent's valuation, the price of the subsidiary continues to increase relative to the parent. Finally, we show that a profitable trading strategy of investing long in the subsidiary and shorting the parent during the negative stub period will yield economically significant positive returns.

References

Anderson, Anne, and Paul Brockman. "An examination of 13F filings." *Journal of Financial Research* 41.3 (2018): 295-324.

Bayar, Onur, Thomas J. Chemmanur, and Mark H. Liu. "A theory of equity carve-outs and negative stub values under heterogeneous beliefs." *Journal of Financial Economics* 100.3 (2011): 616-638.

Lamont, Owen A., and Richard H. Thaler. "Can the market add and subtract? Mispricing in tech stock carve-outs." *Journal of Political Economy* 111.2 (2003): 227-268.

Michaely, Roni, and Wayne H. Shaw. "The choice of going public: Spin-offs vs. carve-outs." *Financial Management* (1995): 5-21.

Mitchell, Mark, Todd Pulvino, and Erik Stafford. "Limited arbitrage in equity markets." *The Journal of Finance* 57.2 (2002): 551-584.

Schill, Michael J., and Chunsheng Zhou. "Pricing an emerging industry: evidence from internet subsidiary carve-outs." *Financial Management* (2001): 5-33.

Schipper, Katherine, and Abbie Smith. "A comparison of equity carve-outs and seasoned equity offerings: Share price effects and corporate restructuring." *Journal of Financial Economics* 15.1-2 (1986): 153-186.

Vijh, Anand M. "Long-term returns from equity carveouts." *Journal of Financial Economics* 51.2 (1999): 273-308.

Vijh, Anand M. "The positive announcement-period returns of equity carveouts: asymmetric information or divestiture gains?." *The journal of business* 75.1 (2002): 153-190.

Table 1

Issuer	Spin-off Parent	–Stub at issue	Total Days	Days –Stub	%–Stub
ATL Products Inc	Odetics Inc	No	394	316	80.20%
Alon USA Partner	Alon USA Energy Inc	Yes	1162	449	38.64%
American Capital	American Capital Strategies	No	2176	157	7.22%
American Nationa	Pechiney SA	Yes	251	250	99.60%
Banco Santander	Banco Santander SA	Yes	2576	1371	53.22%
Box Ships Inc	Paragon Shipping Inc	No	1157	65	5.62%
Brookdale Senior	Fortress Investment Group LLC	Yes	2741	2566	93.62%
CBS Outdoor Amer	CBS Corp	Yes	1451	1428	98.41%
Coach Inc	Sara Lee Corp	No	3496	1458	41.70%
Cognizant Tech S	Cognizant Corp	No	2941	1006	34.21%
Document Science	Xerox Corp	Yes	5025	431	8.58%
FMC Technologies	FMC Corp	No	3922	2853	72.74%
Ferrari NV	Fiat Chrysler Automobiles NV	No	1056	147	13.92%
Independence Rea	RAIT Financial Trust	No	1196	407	34.03%
Inergy Midstream	Inergy LP	No	953	499	52.36%
Instinet Group I	Reuters Group PLC	Yes	1147	1146	99.91%
Logility Inc	American Software Inc	No	2958	246	8.32%
MIPS Technologie	Silicon Graphics Inc	No	1851	243	13.13%
Mego Mortgage Co	Mego Financial Corp	No	859	111	12.92%
Metris Cos Inc	Fingerhut Cos Inc	No	606	46	7.59%
Midway Games Inc	WMS Industries Inc	No	3092	888	28.72%
Novacare Employe	NovaCare Inc	No	489	53	10.84%
Omega Protein Co	Zapata Corp	No	4963	274	5.52%
Palm Inc	3Com Corp	Yes	2543	697	27.41%
Reliant Resource	Reliant Energy Inc	No	2926	319	10.90%
Republic Service	Republic Industries Inc	No	5411	3108	57.44%
Riverstone Netwo	Cabletron Systems Inc	No	643	76	11.82%
Ruthigen Inc	Oculus Innovative Sciences Inc	No	1456	200	13.74%
Shochet Holding	Research Partners Intl Inc	No	286	1	0.35%
SunEdison Semico	SunEdison Inc	No	482	13	2.70%
Symons Internati	Goran Capital Inc	No	927	105	11.33%
TerraForm Global	SunEdison Inc	No	182	17	9.34%
Tim Hortons Inc	Wendy's International Inc	No	635	502	79.06%
TransAct Technol	Tridex Corp	Yes	933	785	84.14%
Trex Medical Cor	ThermoTrex Corp	No	1044	322	30.84%

Issuer	Spin-off Parent	–Stub at issue	Total Days	Days –Stub	%–Stub
US Search.com In	The Kushner–Locke Co	No	458	262	57.21%
United Pan–Europ	United International Holdings	Yes	824	283	34.34%
XLConnect Soluti	Intelligent Electronics Inc	No	402	69	17.16%
XM Satellite Rad	American Mobile Satellite Corp	No	571	247	43.26%
Xpedior Inc	Metamor Worldwide	Yes	129	75	58.14%
uBID Inc	Creative Computers Inc	Yes	354	340	96.05%
Average		29.27%	1626	581	38.20%

Explanation: This table presents the subsidiaries in our sample with a negative stub at any point. Column one identifies the subsidiary firm and column two identifies the parent firm. Column three denotes whether there was a negative stub on the date of the carve-out. Column four shows how many trading days the subsidiary has in our sample. Column five shows how many trading days a negative stub occurs. Column six shows the percent of trading days in our sample the parent-subsidiary combination has a negative stub value. Data are from 1996 through 2019. **Interpretation:** We identify 41 carved-out firms with negative stub values from 1996 through 2019.

Table 2

Panel A

	Subsidiary Industry							
	Mining & Cons	Manufacturing	Utilities	Trade	Finance	Services	Non-Operating	Total
Ming & Construction	5	0	0	0	0	0	1	6
Manufacturing	1	38	3	0	2	8	8	60
Utilities	0	1	8	0	1	2	0	12
Trade	0	1	1	4	1	2	0	9
Finance	0	0	0	0	16	5	4	25
Services	0	3	1	0	1	11	1	17
Non-Operating	1	0	0	0	0	0	0	1
Total Carveouts	7	43	13	4	21	28	14	130
% Subsidiary in Parent Industry	71%	88%	62%	100%	76%	39%	0%	

Parent Industry (row label applies to left column)

Average	62%	Net Non-Operating	73%

Panel B	Year	# Firms with –Stub	Total Par–Sub Firms	% Firms with –Stub
Internet Boom	1996	5	27	19%
	1997	7	48	15%
	1998	11	55	20%
	1999	13	60	22%
	2000	11	55	20%
	2001	9	47	19%
Post–Internet Boom	2002	6	43	14%
	2003	2	37	5%
	2004	5	35	14%
	2005	5	35	14%
	2006	7	31	23%
	2007	8	31	26%
	2008	9	31	29%
	2009	7	29	24%
	2010	6	26	23%
	2011	6	25	24%
	2012	8	31	26%
	2013	8	36	22%
	2014	7	42	17%
	2015	7	42	17%
	2016	10	38	26%
	2017	6	31	19%
	2018	5	22	23%
	2019	5	20	25%

Panel C	Full Sample	At Carve-Out	Inside Lock-up	Outside Lock-up	Follow-on Spinoff	No follow-on Spinoff	Same Industry	Different Industry
Stats	Stub	Stub	Stub	Stub	Stub	Stub	Stub	Stub
Mean	60.75%	67.24%	69.42%	59.22%	52.92%	61.64%	59.26%	62.59%
Median	91.40%	90.34%	93.00%	90.89%	90.35%	91.63%	86.91%	96.81%
Standard Deviation	88.63%	56.09%	53.46%	93.42%	65.88%	90.82%	101.47%	69.47%
N	189,520	130	28,557	160,838	19,382	170,138	104,862	84,658
min	−3362.35%	−289.73%	−509.42%	−3362.35%	−339.73%	−3362.35%	−3362.35%	−513.25%
p5	−53.55%	−27.37%	−31.02%	−59.57%	−102.96%	−45.66%	−38.73%	−85.12%
%–Stub	12.57%	9.23%	9.02%	13.21%	15.84%	12.20%	11.43%	13.99%

Explanation: This table presents summary of carve-outs and the stub values of firms. Panel A is the industry distribution of parent firms and their subsidiaries, Panel B is the number of unique parent-firm combinations of negative stubs per year, and Panel C is the stub value of firms in our full sample, at carve-out, inside(outside) the lock-up period, with(without) a planned follow-on spinoff, and same(different) industry. Stub is measured as (Parent Size– (%Holdings in Subsidiary*Subsidiary Size)/Parent Size. Data are from 1996 through 2019.

Interpretation: Negative stub values exist across time, outside the internet boom, and across industries.

Table 3

Panel A

Float Sort	Within lockup period: negative stub			Float Sort	Outside lockup period: negative stub		
	Parent Return	Subsidiary Return	Par-Sub Return		Parent Return	Subsidiary Return	Par-Sub Return
1	–0.21%	0.09%	–0.30% (–1.86)	1	0.00%	0.11%	–0.11% (–3.01)
2	0.05%	0.24%	–0.19% (–0.60)	2	–0.08%	0.32%	–0.40% (–2.19)

Float Sort	Within lockup period: positive stub			Float Sort	Outside lockup period: positive stub		
	Parent Return	Subsidiary Return	Par-Sub Return		Parent Return	Subsidiary Return	Par-Sub Return
1	0.00%	0.01%	–0.01% (0.15)	1	0.04%	0.02%	0.03% (1.21)
2	0.00%	0.05%	–0.05% (–0.88)	2	0.04%	0.05%	–0.01% (–0.22)

Explanation: This table presents the average daily returns of parents and subsidiaries across floatation sorts for positive and negative stub values. Returns are observed within and outside the lock–up period. Float is one minus the percent held by the parent firm post carve-out. Firms are split at the median in to high and low float. Data are from 1996 through 2019. T-statistics are in parentheses.

Interpretation: Contrary to expectations, subsidiaries in negative stubs have higher returns than parent firms.

Table 4

Panel A: Firm Level Return Regressions	Full Sample	–Stub	+Stub	–Stub Planned	–Stub Unplanned	–Stub Same Ind	–Stub Different Ind	–Stub Lock-up Period	+Stub Lock-up Period
				Dependent Variable – Parent Daily Returns					
Subsidiary Return	0.2179***	0.4351***	0.1904***	0.6646***	0.4137***	0.4218***	0.4878***	0.6638***	0.3233***
	(4.67)	(19.80)	(4.14)	(7.24)	(19.46)	(17.07)	(11.93)	(14.36)	(10.86)
Intercept	0.0002***	–0.0006**	0.0003***	–0.0010	–0.0006**	–0.0012***	0.0001	–0.0018**	0.0001
	(3.15)	(–2.42)	(4.26)	(–1.10)	(–2.14)	(–3.05)	(0.24)	(–2.03)	(0.32)
N	189391	23820	165571	3069	20751	13409	10411	2564	25864
R-sq	0.036	0.089	0.03	0.092	0.091	0.096	0.076	0.25	0.045

Explanation: This table presents regressions of parent daily returns on subsidiary daily returns weighted by parent ownership. Regressions are run in our full sample, –/+ stub, –stub with/out a planned follow-on spinoff, –stub same/different industry, and –/+ inside/outside the lock–up period. Data are from 1996 through 2019. T-statistics are in parentheses.

Interpretation: Rather than converging to a LOP consistent value, –stub firms may continue to stay at LOP inconsistent values.

Table 5

Panel A: Portfolios Long Subsidiary Returns and Short Parent
Returns

Stub	+	–	+	–
	(1)	(2)	(3)	(4)
	Sub–Par Returns	Sub–Par Returns	Sub–Par Returns	Sub–Par Returns
MKT	0.0501***	–0.0438*	0.0062	–0.0771***
	(4.04)	(–1.79)	(0.44)	(–2.77)
SMB	0.4611***	0.1956***	0.4156***	0.1430***
	(18.79)	(4.04)	(16.14)	(2.80)
HML	0.008	–0.4016***	0.0501*	–0.3952***
	(0.35)	(–8.99)	(1.92)	(–7.66)
CMA			–0.0902**	0.0284
			(–2.12)	(0.34)
RMW			–0.2057***	–0.2249***
			(–6.04)	(–3.34)
Alpha	–0.0002	0.0017***	–0.0002	0.0017***
	(–1.64)	(5.76)	(–1.23)	(5.92)
N	5952	5859	5952	5859
R-sq	0.06	0.016	0.067	0.018

Panel B: Stub Portfolio Return

	Float	
	Low	High
+Stub	–0.01%	–0.01%
t-stat	(0.59)	(0.47)
Annual	–2.10%	–1.72%
–Stub	0.16%	0.23%
t-stat	(4.05)	(3.10)
Annualized	47.85%	78.71%

Explanation: This table presents the daily returns of a portfolio long subsidiaries and short parents for positive and negative stubs. Panel A presents portfolios composed of long-subsidiary and short-parent returns across positive and negative stubs regressed on Fama-French factors. Panel B presents portfolio returns of firms sorted into positive or negative stub portfolios and into high or low float. Float is one minus the percent of the carved-out firm held by the parent. Firms are split at the median in to high and low float. Annualized returns reflect compounded average daily returns. Data are from 1996 through 2019. T-statistics are in parentheses.
Interpretation: Investors may profit from the pricing discrepancy.

Figure 1

Long Subsidiary Short Parent Cumulative Return
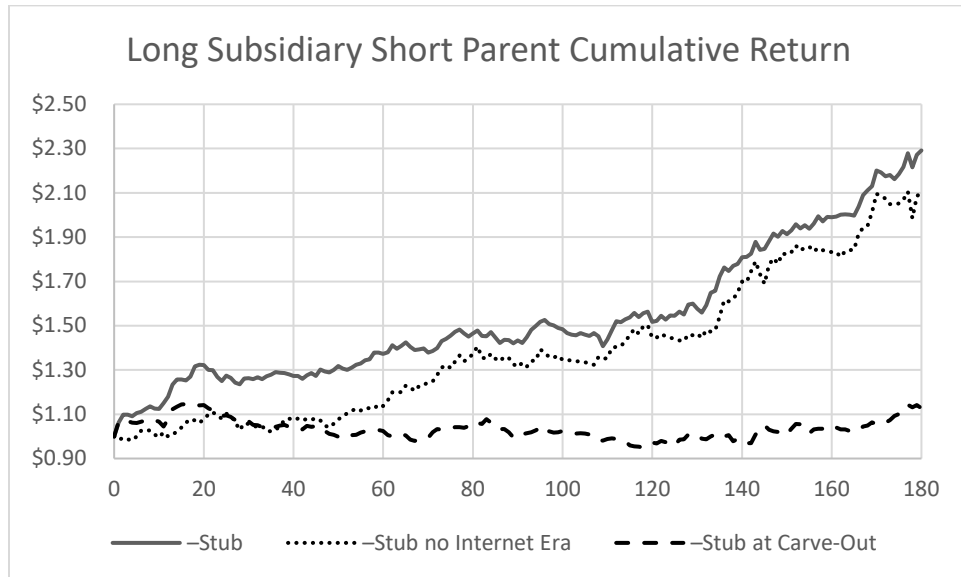
Explanation: This table presents the cumulative performance of a portfolio long subsidiaries and short parents for negative stub firms in the first 180 trading days after a carve-out. Portfolios are generated for the full sample, excluding firms during the internet boom, and for firms with a negative stub at carve-out. Data are from 1996 through 2019.
Interpretation: Investors may profit from the negative stub pricing discrepancy.

Appendix

Issuer	Spinoffs Parent
1347 Property Insurance Hldgs	Kingsway Finl Svcs Inc
3Dfx Interactive Inc	Intel Corp
Agilent Technologies Inc	Hewlett-Packard Co
America Online Latin America	America Online Inc
American Bank Note Holographic	American Banknote Corp
American Capital Mortgage	American Capital Ltd
American Materials & Techs	Palomar Medical Tech Inc
Atria Communities Inc	Vencor Inc
Benefitfocus Inc	Goldman Sachs Group Inc
BioReliance Corp	General American Investors
Blue Capital Reinsurance Hldg	Montpelier Re Holdings Ltd
CIT Group Inc	Tyco International Ltd
Cerion Technologies Inc	Nashua Corp
Chicago Bridge & Iron Co NV	Praxair Inc
Commodore Separation Tech	Commodore Applied Techs
Constar International Inc	Crown Cork & Seal Co
Covisint Corp	Compuware Corp
Cymer Inc	ASM Lithography Holding NV
DTM Corp	BF Goodrich Co
Delphi Automotive Systems Corp	General Motors Corp
Dollar Thrifty Automotive Grp	Chrysler Corp
Donnelley Enterprise Solutions	RR Donnelley & Sons Co
DuPont Photomasks Inc	DuPont
Eagle Geophysical Inc	Seitel Inc (thru wholly owned subsidiary EHI Holdings)
Einstein Bros Bagels Inc	Boston Chicken
Engage Technologies Inc	CMGI Inc
Esperion Therapeutics Inc	Pfizer Inc
Expedia Inc	Microsoft Corp
Fidelity & Guaranty Life	Harbinger Group Inc
Galileo International Inc	British Airways PLC
Galileo International Inc	US Airways
Genesis Lease Ltd	General Electric
Genworth Financial Inc	GE
Halter Marine Group Inc	Trinity Industries
Hugoton Royalty Trust	Cross Timbers Oil Co
Hyperion Telecommunications	Adelphia Communications Corp
Hyseq Inc	Chiron Corp
Hyseq Inc	Perkin Elmer
Innovasive Devices Inc	Collagen
Integrated Living Communities	Integrated Health Services Inc

Issuer	Spinoffs Parent
International Network Services	Cisco Systems Inc
KBR Inc	Halliburton Co
Leju Holdings Ltd	E-House (China) Holdings Ltd
LeukoSite Inc	Warner Lambert
LinnCo LLC	LINN Energy LLC
Lone Pine Resources Inc	Forest Oil Corp
Merus BV	Pfizer Inc
Metrika Systems Corp	Thermo Instrument Systems Inc
Monsanto Co	Pharmacia Corp
Mykrolis Corp	Millipore Corp
NOVA Corp	First Union Corp
NOVA Corp	WorldCom Inc
National Interstate Corp	American Financial Group Inc
National Processing Inc	Natl City Corp,Cleveland,Ohio
NetSilicon Inc	Osicom Technologies Inc
NewCom Inc(Aura Systems Inc)	Aura Systems Inc
Nexar Technologies Inc	Palomar Medical Tech Inc
NextEra Energy Partners LP	NextEra Energy Inc
ONIX Systems Inc	Thermo Instrument Systems Inc
Ocwen Asset Investment Corp	Ocwen Financial Corp
Overnite Corp	Union Pacific Corp
Pfenex Inc	The Dow Chemical Co
Platinum Underwriters Hldg Ltd	RenaissanceRe Holdings
Platinum Underwriters Hldg Ltd	St Paul Cos Inc
Primerica Inc	Citigroup Inc
Progenitor Inc	Interneuron Pharmaceuticals
Provantage Health Services	ShopKo Stores Inc
Regulus Therapeutics Inc	Alnylam Pharmaceuticals Inc
Regulus Therapeutics Inc	Astrazeneca
Regulus Therapeutics Inc	Isis Pharmaceuticals
Select Income REIT	CommonWealth REIT
Southern Pacific Funding,OR	Imperial Credit Industries Inc
Suncoke Energy Inc	Sunoco Inc
TD Waterhouse Group Inc	Toronto-Dominion Bank
Terra Networks(Telefonica SA)	Telefonica SA
Thermo BioAnalysis(Thermo)	Thermo Instrument Systems Inc
Thermo Fibergen Inc	Thermo Fibertek Inc
Thermo Optek Corp	Thermo Instrument Systems Inc
Thermo Vision(Thermo Inst)	Thermo Instrument Systems Inc
Think New Ideas Inc	Omnicom Group
Tut Systems Inc	Microsoft Corp
UCP Inc	PICO Holdings Inc

Issuer	Spinoffs Parent
Verigy Ltd	Agilent Technologies Inc
Viper Energy Partners LP	Diamondback Energy Inc
Virage Logic Corp	Tower Semiconductor
Whiting USA Trust II	Whiting Petroleum Corp
Wright Express Corp	Cendant Corp
XM Satellite Radio Hldgs Inc	General Motors Corp
ZymoGenetics Inc	Novo Nordisk A/S
inSilicon Corp	Phoenix Technologies Ltd

Explanation: This table presents the carved-out subsidiaries and their parents in our sample with a positive stub. Data are from 1996 through 2019.