Valuation Estimates and Return Smoothing: Evidence from Private Equity Real Estate Assets *

Spencer J. Couts†

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Abstract

Illiquid assets are believed to have stale prices and spurious return autocorrelation. An important question is what drives this autocorrelation. I provide evidence that the primary driver of this phenomenon is the difficulty in valuing these assets, and not managerial manipulation. Specifically, I find that autocorrelations, risk factor loadings, (β's) and risk-adjusted returns (α's), are statistically equivalent regardless of whether they are completed internally or externally. I do find, however, that loadings on lagged risk factors increase significantly when valuation estimates are completed externally. Consistent with this, I also find that external valuations have significantly larger valuation changes than internal valuations. However, both of these findings are primarily due to valuation effort and the types of properties being valued externally. External and internal valuations become economically equivalent after controlling for valuation effort and property characteristics. I also find that funds choose to have properties valued externally at those times, and for those properties, when valuation changes are expected to be the largest. Lastly, I find that managers exert the greatest effort on internal valuations at those times when valuation changes are expected to be the largest and the least amount of effort at those times when valuation changes are expected to be the smallest and slightly positive.

JEL Classification: G11, G12, G13, G14, G23, R33
Keywords: Commercial Real Estate, Illiquid Assets, Return Smoothing

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†University of Southern California, Lusk Center of Real Estate, 319 Ralph & Gold Lewis Hall, 650 Childs Way, Los Angeles, CA 90089. Phone: (972) 836-8604. Fax: (213) 740-6170. E-mail: couts@usc.edu.

1 Introduction

Illiquid assets have been shown to have positive autocorrelation in their returns (smoothed returns) (see Geltner (1991), Geltner (1993), Getmansky et al. (2004), and Couts et al. (2020)). In order to account for this smoothing, it is important to understand the extent to which managerial choices influence this phenomenon. Managers may be incentivized to manipulate their returns either by carrying forward prior performance or by maximizing their returns when raising capital (see Aragon and Nanda (2017), Bollen and Pool (2008, 2009), Jackson et al. (2022)). However, it is difficult to know the fair value of illiquid assets when they are not trading and return smoothing could simply be due to the difficulty in valuing these assets (see Cassar and Gerakos (2011) and Cao et al. (2017)). This paper attempts to address this question by analyzing the effect of managerial choices on measures of return smoothness in U.S. Private Equity Real Estate (PERE) assets.

Economists have had limited ability in analyzing the sources of return smoothing due to data limitations. To overcome this challenge, I utilize a proprietary data set which provides quarterly asset-level information for U.S. PERE properties from 1978 to 2021. The data come from the National Council of Real Estate Investment Fiduciaries (NCREIF). [1] By analyzing the property holdings of PERE investors, I am able to evaluate their valuation choices along with the corresponding asset characteristics and market conditions. This gives me the ability to directly evaluate how these valuation choices influence the risk and return characteristics these assets achieve. Additionally, it gives me the ability to evaluate the factors that influence their valuation choices.

First, I evaluate the effect of the valuation source on return autocorrelation. Assets which are valued internally might exhibit either greater or less return autocorrelation than assets which are valued externally. By valuing assets internally, managers could potentially smooth their return performance over time by carrying forward superior, or inferior, performance. However, when asset values are updated very infrequently they exhibit less return autocorrelation. Therefore, internal valuations could lead to lower levels of autocorrelation if managers

[1] NCREIF is the leading collector of institutional real estate investment information and provides the primary industry benchmark for institutional investors. NCREIF represents roughly $500 billion in assets under management as of the fourth quarter 2015.

put forth little to no effort when valuing assets internally. In order to evaluate this, I create two indexes. The first index includes all properties in the sample and the second index only includes properties which have been valued by a their-party valuation consultant. I find that the autocorrelations for both indexes are statistically and economically equivalent. This evidence suggests that at the market-level, PERE asset return autocorrelations are unaffected by whether the valuation estimate is completed internally or externally.

Next, I evaluate the effect of the valuation source on contemporaneous risk loading, β, and risk-adjusted return, α, measures. It is possible that properties which were valued internally have significantly lower risk factor loadings and significantly higher risk-adjusted return measures. If managers are incentivized to achieve higher reported α, then they may be incentivized to manipulate valuations in a way that increases their perceived risk-adjusted performance. I evaluate this question in two ways. First I regress the returns from two indexes on common risk factors. The first index includes all properties in the sample and the second index only includes properties which have been valued by a their-party valuation consultant. Second, I sort the assets consistently with the way the indexes where created and regress the assets returns on these same risk factors. In doing so, I find that contemporaneous risk factor loadings, β's, and risk-adjusted returns, α's, are statistically equivalent between internally and externally valued assets. In all, this evidence suggests that contemporaneous risk and risk-adjusted return measures are unaffected by whether the valuation estimates are completed internally or externally.

Next, I evaluate the effect of valuation sources on lagged risk loadings. It is possible properties which are valued internally have either larger or smaller loadings on lagged market risk factors. I find that loadings on lagged risk factors are significantly larger for external valuations than internal valuations. However, the primary reason for this is the lack of effort managers place on a large portion of internal valuations. After accounting for lame valuations, I find that the loadings on lagged risk factors are statistically equivalent between internally and externally valued assets.[2] This evidence suggests the valuation source does have an impact on evaluating exposure to lagged risk factors. However, it also suggests one

[2]I define a lame valuation as one where the current value either equals the lagged value, the lagged value plus CapEx, or the lagged value plus CapEx less partial sales.

possible remedy is to incentivize managers to decrease the number of their lame internal valuations. This evidence also suggests that switching between internal and external valuations has the effect of creating time-varying smoothing.

Next, I evaluate the effect of valuation sources on the size of the valuation change. It is possible properties internal valuations have larger updates since managers know more about their assets than an external consultant. It is also possible, though, that external valuations have larger valuation changes since managers may be incentivized to smooth returns. I find that external valuation updates are significantly larger than internal valuation updates. However, the primary reason for this is valuation effort and the types of properties managers choose to value internally. After removing lame valuations and controlling for property characteristics, I find that the valuation updates between internally and externally valued assets are economically equivalent. This evidence suggests internal and external valuations are of equal caliber after controlling for effort. However, it again suggests investors may want to consider ways to incentivize managers to decrease the number of lame internal valuations.

Next, I evaluate the conditions surrounding when managers choose to have properties valued internally versus externally. Managers could choose to have assets valued internally at those times when it would be most beneficial to influence the returns. Specifically, managers might be incentivized to value assets internally when returns are expected to be significantly positive, significantly negative, or even when they are slightly negative in order to carry some of these returns forward. In contrast, managers could be incentivized to have assets valued externally at these times in order to limit their liability from potential lawsuits. I find that find that managers choose to have an external appraiser when overall real estate market returns are more extreme, the property is more likely to have an extreme return, and when the property is in an open-ended fund.

Lastly, I evaluate the conditions that are associated with lame valuations. Managers might be incentivized to influence valuations to be lame at those times when it would be most beneficial to them. Specifically, managers might be incentivized to have lame valuations when returns are expected to be significantly positive, significantly negative, or even when they are slightly negative in order to carry some of these returns forward. In contrast, managers could be incentivized to not have lame valuations at these times in order to limit

their liability from potential lawsuits. I find that valuations are more likely to be lame when overall market returns are less extreme, the property return is less likely to have a less extreme return, and when the property is in a closed-end fund. In all, this evidence suggests managers are more concerned about making sure their asset valuations are correct at those times when investors would be most concerned about managerial manipulation.

The rest of the paper is outlined as follows. In Section 2, I provide an overview of the OPRE market and risk exposure. In Section 3, I discuss the data and the variables of interest. Section 4 provides the results from my empirical analysis and I conclude in Section 5. The Appendix provides the results from my supplemental analysis.

2 Private Equity Real Estate Market

3 Data and Summary Statistics

4 Empirical Results

5 Conclusion

Table 1
Price Change Size & Valuation Type

This table provides the distribution of capital appreciation values based on whether the valuation estimate was completed internally or externally and whether it was lame or valid (non-lame). A Lame Valuation is one where any one of the following three conditions is met for the valuation estimate: (i) the current value equals the lagged value, (ii) the current value equals the lagged value plus any CapEx, or (iii) the current value equals the lagged value plus any CapEx less any partial sales.
Modify this to only be for the years 2000 to 2021!!!

	1978 - 2021				2011 - 2021							
	All Valuations		Non-Lame Only		All Valuations		Non-Lame Only					
stats	External	Internal	External	Internal	External	Internal	External	Internal	Lame	$Return_{i,t}$	$Return_{NPI,t}$	$Return_{REIT,t}$
N	308,310	494,013	252,846	225,606	210,506	189,626	171,305	107,621				
mean	1.01	0.27	1.27	0.68	1.47	0.82	1.83	1.50	32	0.59	0.60	2.01
sd	5.23	3.74	5.73	5.46	4.42	3.80	4.80	4.90	47	4.92	2.20	9.92
min	-20.00	-20.00	-20.00	-20.00	-19.99	-19.99	-19.99	-19.99	0	-25.00	-9.54	-40.00
p1	-15.25	-13.36	-15.87	-16.20	-10.75	-10.74	-11.58	-13.03	0	-16.15	-8.70	-33.09
p5	-7.73	-4.74	-8.79	-9.09	-4.13	-3.32	-4.77	-5.56	0	-6.50	-3.71	-13.73
p10	-4.00	-1.47	-4.96	-5.08	-2.05	-1.10	-2.52	-2.66	0	-2.69	-1.40	-7.59
p25	-0.50	0.00	-0.91	-0.62	-0.16	0.00	-0.27	-0.09	0	-0.05	0.14	-2.09
p50	0.29	0.00	0.90	0.10	0.47	0.00	1.01	0.50	0	0.00	0.69	2.00
p75	2.88	0.01	3.75	2.53	2.82	0.88	3.63	3.14	100	1.13	1.75	7.55
p90	7.12	3.15	8.12	6.95	6.76	4.75	7.76	7.45	100	5.31	2.54	12.23
p95	10.62	6.51	11.55	10.59	10.20	8.14	11.12	11.04	100	9.15	3.21	15.36
p99	16.76	14.27	17.22	16.81	16.49	15.44	17.01	17.09	100	17.90	5.12	26.99
max	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	100	25.00	5.12	31.86

Table 2
Return Autocorrelations

This table presents the results from my analysis on the drivers of return autocorrelation. Panel A presents the autocorrelations for an index based on all available properties in the NCREIF Property Index. Panel B presents the results for those properties in the NCREIF Property Index where the valuations were completed externally by a third-party appraisal company. The samples go from 2000 to 2021.

Panel A: All Valuations (External and Internal)

	$Return_t$	$Return_{t-1}$	$Return_{t-2}$	$Return_{t-3}$	$Return_{t-4}$	$Return_{t-5}$	$Return_{t-6}$
$Return_t$	1.00						
$Return_{t-1}$	0.85	1.00					
$Return_{t-2}$	0.66	0.85	1.00				
$Return_{t-3}$	0.43	0.66	0.85	1.00			
$Return_{t-4}$	0.22	0.44	0.68	0.85	1.00		
$Return_{t-5}$	(0.02)	0.23	0.46	0.68	0.85	1.00	
$Return_{t-6}$	(0.17)	(0.00)	0.25	0.47	0.68	0.85	1.00

Panel B: External Valuations Only

	$Return_t$	$Return_{t-1}$	$Return_{t-2}$	$Return_{t-3}$	$Return_{t-4}$	$Return_{t-5}$	$Return_{t-6}$
$Return_t$	1.00						
$Return_{t-1}$	0.86	1.00					
$Return_{t-2}$	0.65	0.86	1.00				
$Return_{t-3}$	0.41	0.64	0.86	1.00			
$Return_{t-4}$	0.19	0.42	0.65	0.86	1.00		
$Return_{t-5}$	(0.04)	0.20	0.43	0.66	0.86	1.00	
$Return_{t-6}$	(0.21)	(0.03)	0.21	0.44	0.66	0.86	1.00

Table 3
Factor Loading and Alpha Estimates

This table presents the results from my analysis on the effect of valuation type on factor loading and intercept estimates. All returns are in excess of the three-month t-bill. The public market real estate return is proxied the Russell NAREIT Index. The factors from the Fama French Five-factor Model are obtained from the website of Kenneth French. The private market real estate return is proxied the returns from the NCREIF Property Index. The samples go from 2000 to 2021. Standard errors are robust and adjusted for heteroskedasticity. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level respectively.

$$return_{i,t} = \alpha + \beta_1 return_{Public\,RE\,Market,t} + \varepsilon_{i,t}$$

$$return_{i,t} = \alpha + \beta_1 return_{FF\,Market,t} + \beta_2 SMB_t + \beta_3 HML_t + \beta_4 RMW_t + \beta_5 CVA_t + \varepsilon_{i,t}$$

$$return_{i,t} = \alpha + \beta_1 return_{Private\,RE\,Market,t} + \varepsilon_{i,t}$$

	All Valuations (External and Internal)				External Valuations Only			
Portfolio	Excess Return	Public	5-Factor	Private	Excess Return	Public	5-Factor	Private
α	0.008***	0.006***	0.006***	-0.000*	0.010***	0.008***	0.008***	0.001
	(3.21)	(2.73)	(2.65)	(-1.68)	(3.39)	(2.79)	(2.83)	(0.81)
Public Market		0.061				0.065		
		(1.63)				(1.18)		
FF Market			0.135**				0.153*	
			(2.01)				(1.67)	
FF SMB			-0.177*				-0.268**	
			(-1.85)				(-2.16)	
FF HML			0.088				0.160	
			(0.68)				(0.90)	
FF RMW			-0.114				-0.162	
			(-1.04)				(-1.24)	
FF CVA			-0.112				-0.164	
			(-0.74)				(-0.88)	
Private Market				1.000***				1.162***
				(2.14e+16)				(21.28)
N	88	88	88	88	88	88	88	88
R^2	0.00	0.08	0.13	1.00	0.00	0.06	0.14	0.91

Table 4
Lagged Factor Loading and Alpha Estimates

This table presents the results from my analysis on the effect of valuation type on lagged factor loading and intercept estimates. All returns are in excess of the three-month t-bill. The public market real estate return, $r_{M,t}$, is proxied by the Russell NAREIT Index. Standard errors are robust and adjusted for heteroskedasticity. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level respectively.

$$r_{i,t} = \alpha + \beta_1 r_{M,t} + \beta_2 r_{M,t-1} + \beta_3 r_{M,t-2} + \beta_4 r_{M,t-3} + \beta_5 r_{M,t-4} + \beta_6 r_{M,t-5} + \beta_7 r_{M,t-6} + \beta_8 r_{M,t-7} + \varepsilon_{i,t}$$

	All Valuations (External and Internal)				External Valuations Only	
	w/ Lame Valuations		w/ out Lame Valuations			
	1980 - 2021	2000 - 2021	1980 - 2021	2000 - 2021	1980 - 2021	2000 - 2021
α	-0.003***	0.002***	0.002***	0.005***	0.002***	0.005***
$r_{M,t}$	0.081***	0.066***	0.083***	0.077***	0.075***	0.069***
$r_{M,t-1}$	0.069***	0.055***	0.084***	0.079***	0.088***	0.082***
$r_{M,t-2}$	0.087***	0.077***	0.110***	0.105***	0.115***	0.110***
$r_{M,t-3}$	0.072***	0.060***	0.092***	0.090***	0.087***	0.085***
$r_{M,t-4}$	0.098***	0.083***	0.128***	0.119***	0.124***	0.115***
$r_{M,t-5}$	0.048***	0.033***	0.066***	0.058***	0.064***	0.056***
$r_{M,t-6}$	0.055***	0.040***	0.069***	0.058***	0.066***	0.056***
$r_{M,t-7}$	0.026***	0.010***	0.034***	0.026***	0.032***	0.024***
$r_{M,t-8}$	0.046***	0.028***	0.058***	0.042***	0.052***	0.037***
N	808,334	680,608	486,139	433,465	312,794	289,364
R^2	0.10	0.05	0.16	0.13	0.14	0.12

Table 5
Return Size & Appraisal Type

This table presents the results from my analysis on the impact of external valuations on the size of the valuation change. The Appreciation Return is calculated as follows: $appreciation\ return_t = {}^{value_t}/_{value_{t-1}} - 1$. Standard errors are robust and adjusted for heteroskedasticity. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level respectively.

$$|appreciation\ return_{i,t}| = \alpha_i + \beta_1 External_{t,i} + controls + \varepsilon_{i,t}$$

$$|appreciation\ return_{i,t}| = \alpha_i + \beta_1 External_{t,i} + controls + \varepsilon_{i,t}\ , where\ reutnr_{i,t} \leq 0$$

$$|appreciation\ return_{i,t}| = \alpha_i + \beta_1 External_{t,i} + controls + \varepsilon_{i,t}\ , where\ reutnr_{i,t} \geq 0$$

	All Valuations			No Lame Valuations			Controls Added		
	$x = all$	$x \leq 0$	$x \geq 0$	$x = all$	$x \leq 0$	$x \geq 0$	$x = all$	$x \leq 0$	$x \geq 0$
$External_{i,t}$	0.033***	0.028***	0.034***	0.021***	0.016***	0.022***	0.008***	0.004***	0.011***
	(33.84)	(20.46)	(32.57)	(23.17)	(15.66)	(26.93)	(10.06)	(4.03)	(16.04)
Controls	No	No	No	No	No	No	Yes	Yes	Yes
Property f.e.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time f.e.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	809,059	492,622	570,959	483,580	171,324	304,721	233,836	78,441	150,714
R^2	0.21	0.30	0.26	0.26	0.39	0.29	0.30	0.44	0.34

Table 6
Lame Appraisals by Appraisal Type

This table presents the results from my analysis of the relation between lame valuations and valuation type. A lame valuation is one where the current value either equals the lagged value, the lagged value plus CapEx, or the lagged value plus CapEx less partial sales. Standard errors are robust and adjusted for heteroskedasticity. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level respectively.

$$Lame_{i,t} \in \{0,1\} = \beta_0 + \beta_1 External_{i,t} \in \{0,1\} + \beta_2 Internal_{i,t} \in \{0,1\} + \beta_3 None_{i,t} \in \{0,1\} + \varepsilon_{i,t}$$

External	-0.617***	-0.400***		
	(-171.17)	(-118.49)		
Internal	-0.309***		0.066***	
	(-91.91)		(17.30)	
None				0.430***
				(137.65)
β_0	0.747***	0.528***	0.330***	0.287***
	(294.07)	(366.79)	(211.30)	(562.97)
Property f.e.	Yes	Yes	Yes	Yes
Time f.e.	No	No	No	No
N	690,984	690,984	690,984	690,984
R^2	0.33	0.31	0.24	0.30

Table 7
Lame Appraisals & Property Characteristics

This table presents the results from analysis on the the property characteristics which influence the likelihood a property valuation will be lame, external, internal, or none. A lame valuation is one where the current value either equals the lagged value, the lagged value plus CapEx, or the lagged value plus CapEx less partial sales. Standard errors are robust and adjusted for heteroskedasticity. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level respectively.

$$Lame_{i,t} \in \{0,1\} = \beta_0 + \beta_1 characteristic\,1 + ... + \beta_k \beta_1 characteristic\,k + \varepsilon_t$$

$$External_{i,t} \in \{0,1\} = \beta_0 + \beta_1 characteristic\,1 + ... + \beta_k \beta_1 characteristic\,k + \varepsilon_t$$

$$Internal_{i,t} \in \{0,1\} = \beta_0 + \beta_1 characteristic\,1 + ... + \beta_k \beta_1 characteristic\,k + \varepsilon_t$$

$$None_{i,t} \in \{0,1\} = \beta_0 + \beta_1 characteristic\,1 + ... + \beta_k \beta_1 characteristic\,k + \varepsilon_t$$

	Lame	External	Internal	None
$Core_{i,t}$	-0.056***	0.043***	0.002	-0.045***
$Industrial_{i,t}$	0.067***	-0.054***	0.102***	-0.049***
$Land_{i,t}$	0.192***	-0.102***	-0.006	0.107***
$CapEx_{i,t}$	-0.785***	0.050*	0.020	-0.070***
$CapEx_{i,t-1}$	-0.066*	-0.110***	-0.008	0.118***
$CapEx_{i,t-2}$	-0.059*	-0.073***	0.055**	0.018
$CapEx_{i,t-3}$	0.197***	-0.225***	-0.007	0.232***
$CapEx_{i,t-4}$	-0.379***	0.041*	-0.052**	0.011
$\lvert App\ Ret_{i,t-1}\rvert$	0.056***	-0.019***	0.052***	-0.032***
$\lvert App\ Ret_{i,t-2}\rvert$	0.091***	-0.070***	0.101***	-0.030***
$\lvert App\ Ret_{i,t-3}\rvert$	0.082***	-0.077***	0.114***	-0.037***
$\lvert App\ Ret_{i,t-4}\rvert$	-0.416***	0.339***	-0.053***	-0.286***
$App\ Int_{i,t-1}$	-0.088***	0.024***	0.003	-0.027***
$App\ Int_{i,t-2}$	-0.113***	0.065***	-0.028***	-0.037***
$App\ Lame_{i,t-1}$	-0.019***	0.004	-0.003	-0.001
$App\ Lame_{i,t-2}$	-0.006**	0.011***	-0.019***	0.008***
$Closed\ Fund$	0.138***	-0.106***	-0.042***	0.148***
$Open\ Fund_{Non-ODCE}$	-0.097***	0.142***	-0.080***	-0.062***
$Open\ Fund_{ODCE}$	-0.139***	0.313***	-0.153***	-0.160***

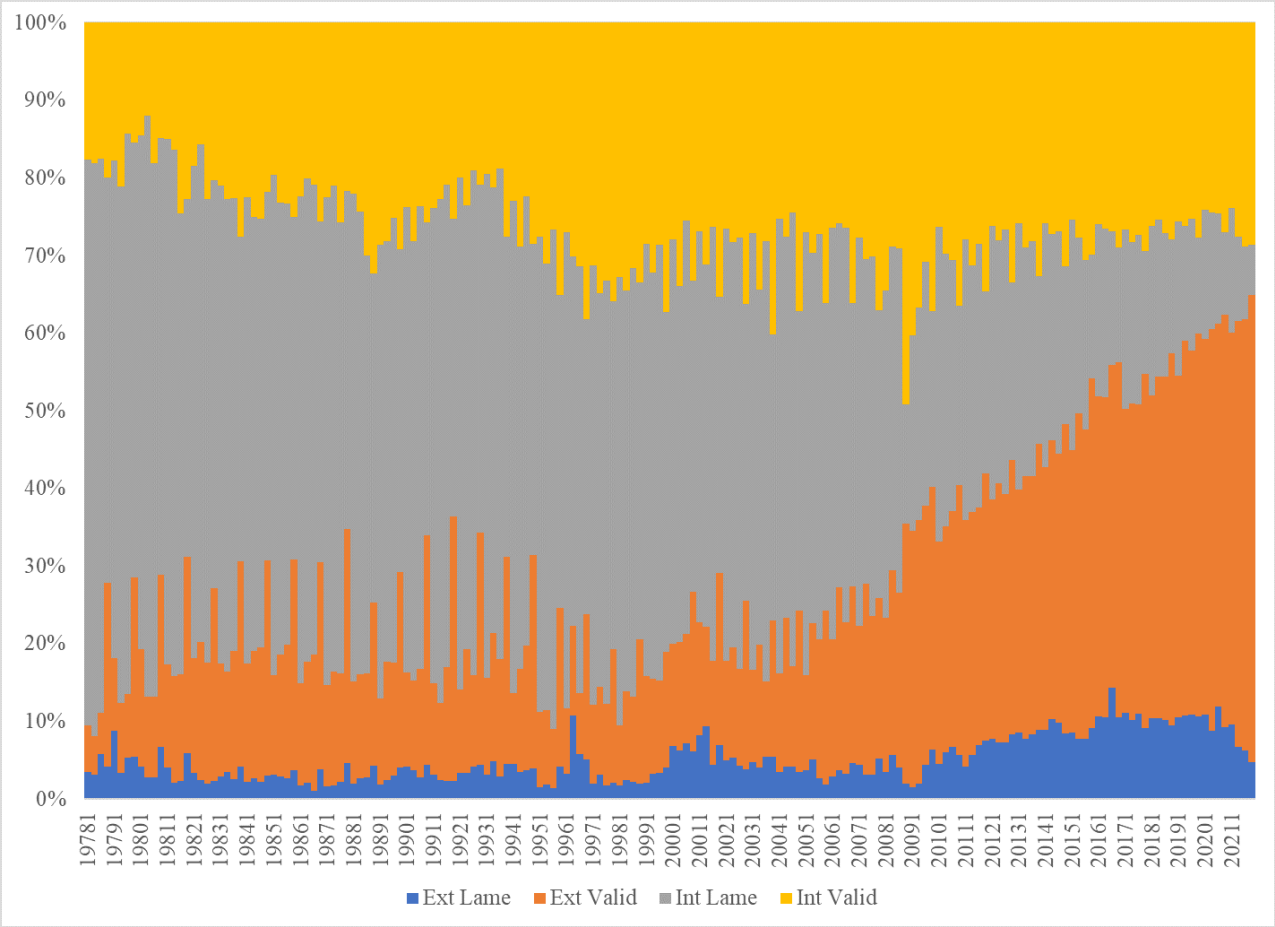

Figure 1
External vs Internal (lame vs. valid)

This figure shows the percentage breakdown of internal versus external valuation estimates. It also breaks internal and external valuation updates into valid or lame. A Lame Valuation is one where any one of the following three conditions is met for the valuation estimate: (i) the current value equals the lagged value, (ii) the current value equals the lagged value plus any CapEx, or (iii) the current value equals the lagged value plus any CapEx less any partial sales.

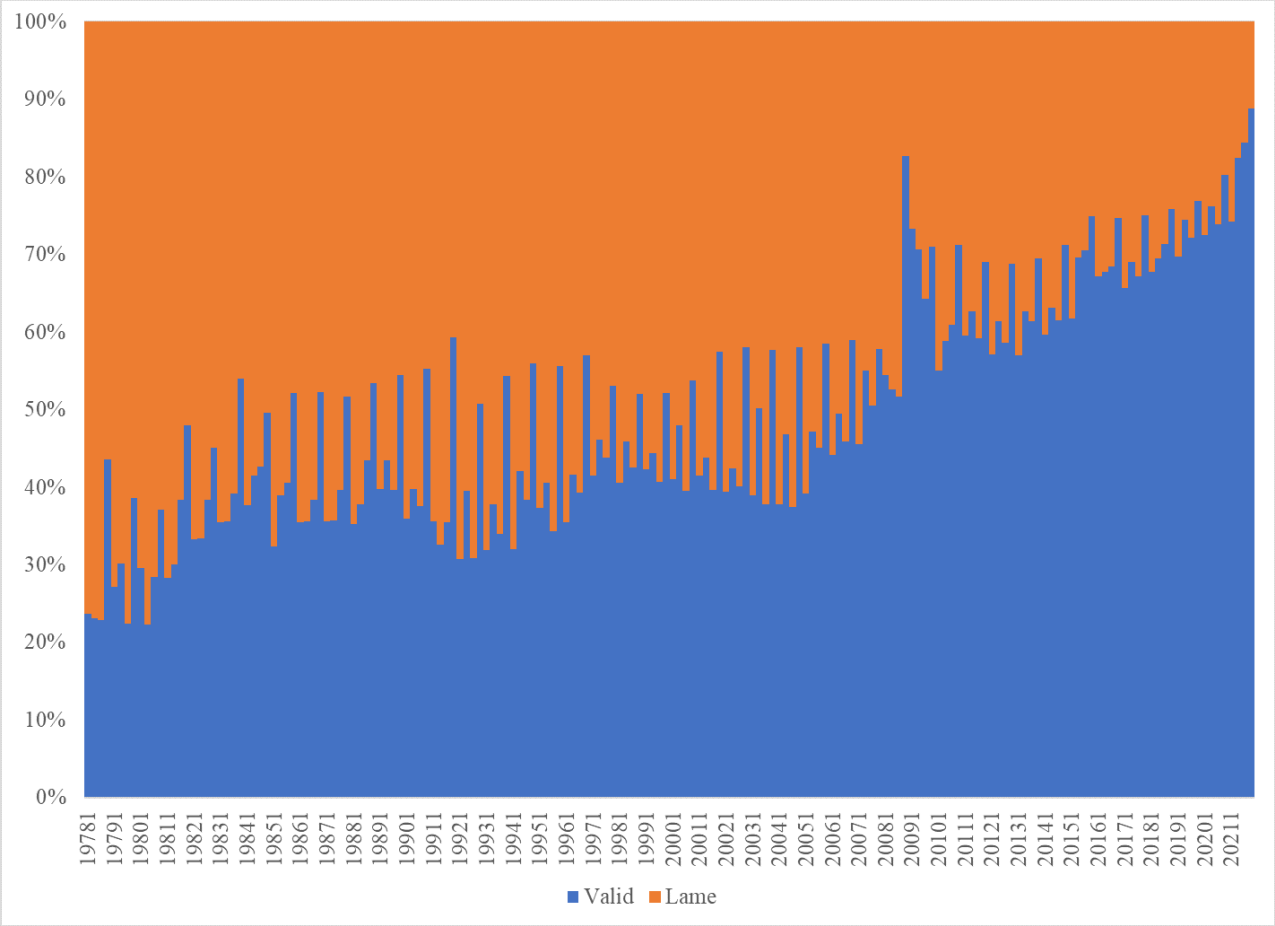

Figure 2
Lame vs. Valid

This figure shows the percentage breakdown of valid and lame valuations, regardless of whether they are completed internally or externally. A Lame Valuation is one where any one of the following three conditions is met for the valuation estimate: (i) the current value equals the lagged value, (ii) the current value equals the lagged value plus any CapEx, or (iii) the current value equals the lagged value plus any CapEx less any partial sales.

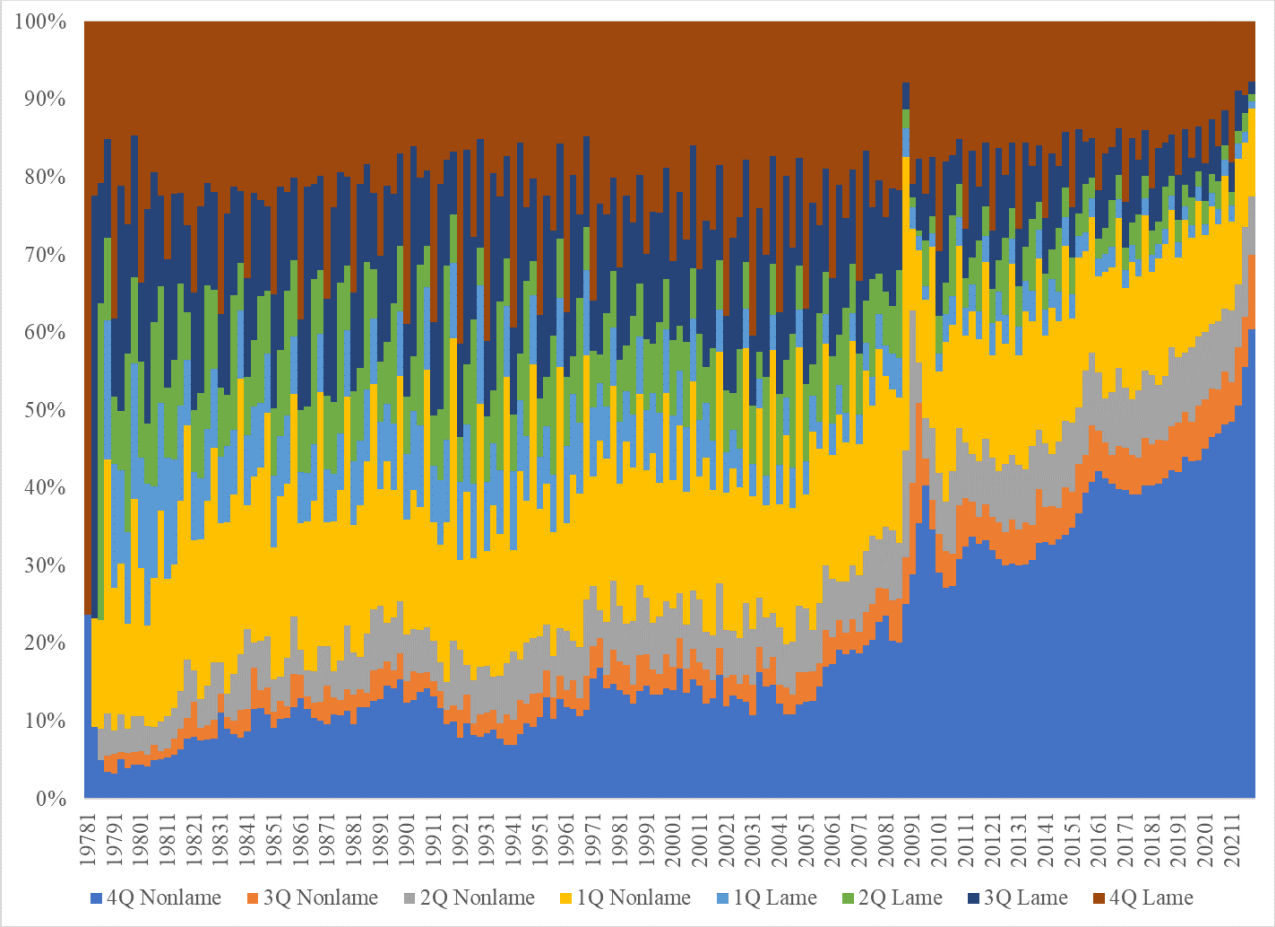

Figure 3
Lame vs. Valid

This figure shows the percentage breakdown of valid and lame valuations. It further dissects these groupings into sequential groups based on whether lagged valuations were valid or lame by looking at the four quarter sequence of valuation estimates. A Lame Valuation is one where any one of the following three conditions is met for the valuation estimate: (i) the current value equals the lagged value, (ii) the current value equals the lagged value plus any CapEx, or (iii) the current value equals the lagged value plus any CapEx less any partial sales.

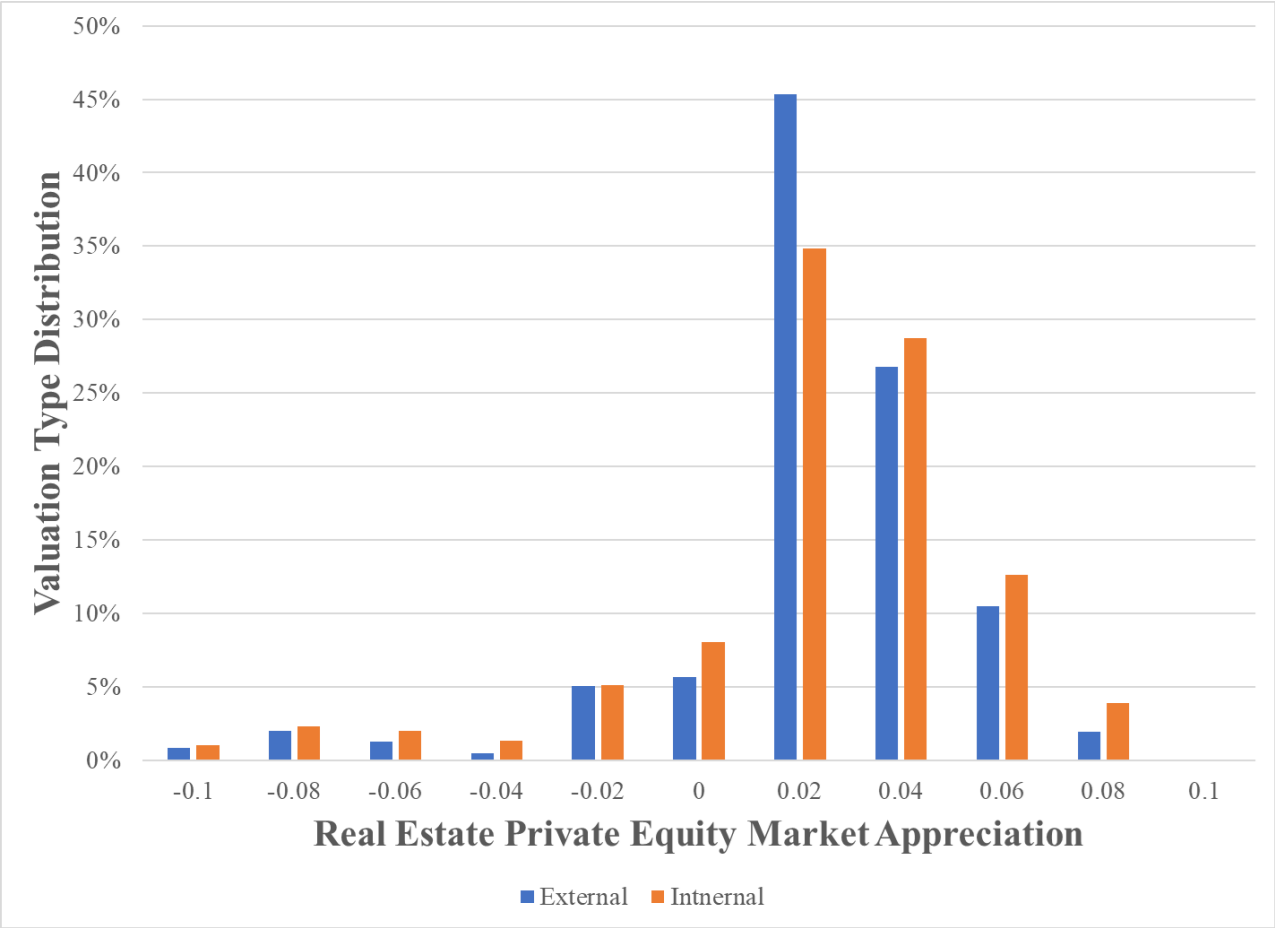

Figure 4
Lame vs. Valid

This figure shows the percentage breakdown of valid and lame valuations, regardless of whether they are completed internally or externally. A Lame Valuation is one where any one of the following three conditions is met for the valuation estimate: (i) the current value equals the lagged value, (ii) the current value equals the lagged value plus any CapEx, or (iii) the current value equals the lagged value plus any CapEx less any partial sales.

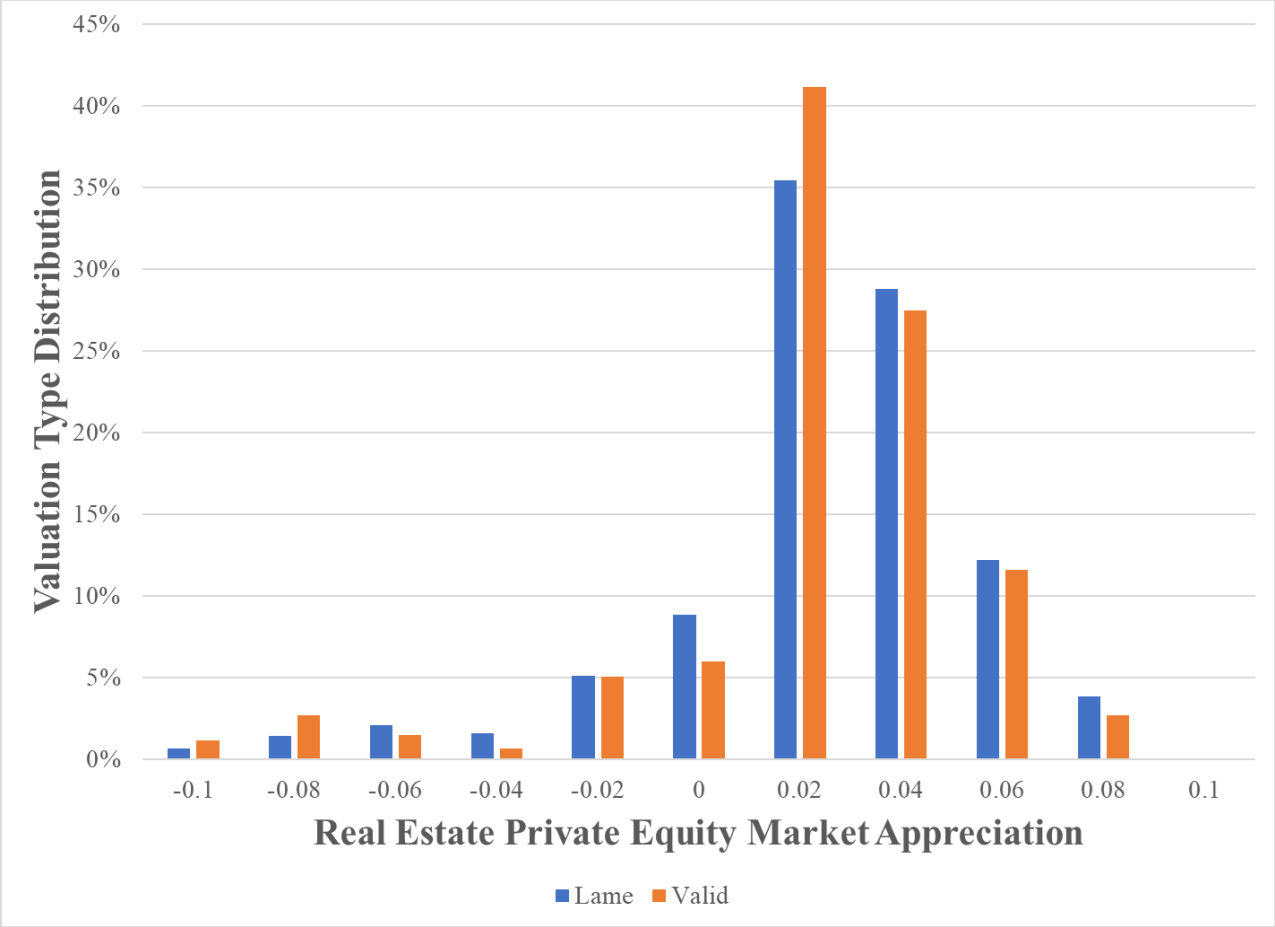

Figure 5
Lame vs. Valid

This figure shows the percentage breakdown of valid and lame valuations. It further dissects these groupings into sequential groups based on whether lagged valuations were valid or lame by looking at the four quarter sequence of valuation estimates. A Lame Valuation is one where any one of the following three conditions is met for the valuation estimate: (i) the current value equals the lagged value, (ii) the current value equals the lagged value plus any CapEx, or (iii) the current value equals the lagged value plus any CapEx less any partial sales.

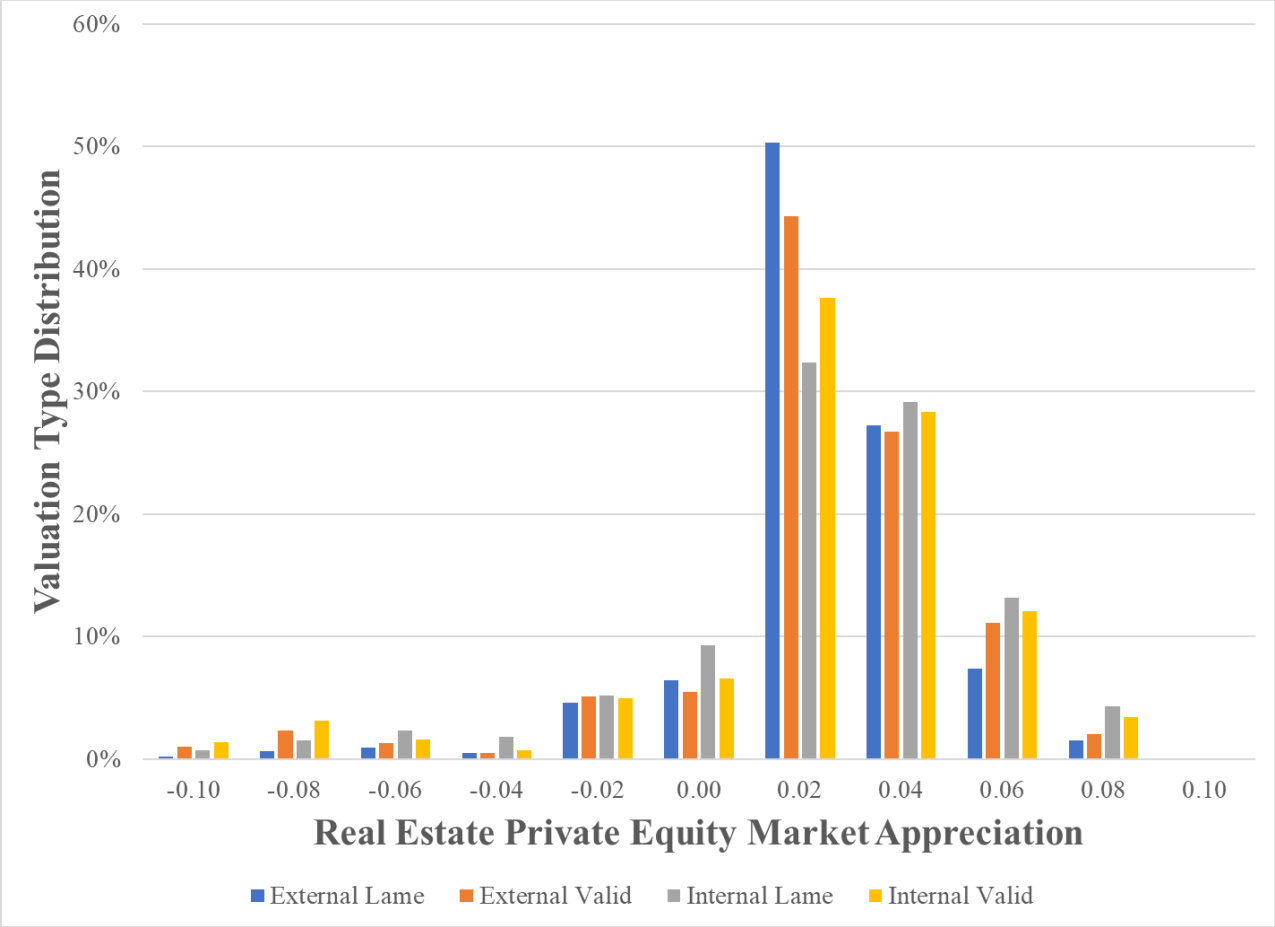

Figure 6
Lame vs. Valid

This figure shows the percentage breakdown of valid and lame valuations. It further dissects these groupings into sequential groups based on whether lagged valuations were valid or lame by looking at the four quarter sequence of valuation estimates. A Lame Valuation is one where any one of the following three conditions is met for the valuation estimate: (i) the current value equals the lagged value, (ii) the current value equals the lagged value plus any CapEx, or (iii) the current value equals the lagged value plus any CapEx less any partial sales.

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