What Drives Corporate Private Equity? An Historical Perspective*

John V. Duca*
Oberlin College, Dept. of Economics, 223 Rice Hall, Oberlin, OH 44074, jduca@oberlin.edu
Research Department, Federal Reserve Bank of Dallas, P.O. Box 655906, Dallas, TX 75265
john.v.duca@dal.frb.org

Franklin Sanchez-Colburn
Oberlin College
Oberlin, OH 44074

January 12, 2023

Abstract

This study helps fill a gap in the literature by modeling how the closely (privately) held share of U.S. nonfinancial corporate equity has moved in the short- and long-runs. Reflecting the various of factors affecting this dimension of corporate organization, we find roles for regulation, taxation, default risk, and the real long-run Treasury yield. In particular changes in the tax incentives to be publicly listed versus being an S corporation matter. In addition, the PE share tends to be higher when businesses are perceived to be financially healthier, and when real long-term Treasury rates are low. The latter result could reflect tendencies for investors to "reach for yield" that are linked to the "risk-taking channel" of monetary policy. Also, real bond yields make it less costly for PE fund managers to borrow to smooth distributions to investors during the long period when a fund is being liquidated. This interest rate effect is more important for PE than publicly traded corporations, for which taxes discourage dividend payments to investors. Finally, the Sarbanes-Oxley Act has also contributed to the rise of private equity consistent with concerns that SOX has increased the costs of continuing as or becoming a publicly traded corporation. No single one of these factors can sufficiently model the trends in the privately held share of the U.S. nonfinancial corporate sector. Taken together, the factors we incorporate track the major trends and swings in the relative importance of PE within the corporate sector.

Keywords: Private Equity, Regulation, Sarbanes-Oxley

JEL Codes: E40, E50, G21

* We thank, and seminar participants for suggestions. The views expressed are those of the authors and do not necessarily reflect the views of the Federal Reserve Bank of Dallas or the Federal Reserve System. Any remaining errors are those of the authors.

So far this century the number of publicly traded U.S. corporations has fallen by nearly a third amid a shift toward relying on private sources of funding (see Aramonte and Avalos, 2021, *inter alia*). By some counts, fund-raising from private markets has increased more than ten-fold across the globe and in North America in nominal terms (from 2003 to 2021, McKinsey, 2022, p. 6). Analyzing the evolution of private equity is hampered by limited, continuous data about non-publicly traded firms. Using nearly a quarter century of quarterly data (1998-2022) from the Federal Reserve's *Financial Accounts of the United States*, this paper analyzes one aspect of this phenomenon, namely the main drivers behind notable shifts in the share of U.S nonfinancial corporate equity in closely held corporate entities (C- and S-class corporations). Movements in the share of nonfinancial corporate equity in non-publicly traded corporations (henceforth, the "private equity share") have not been unidirectional. The private equity share has shifted up from about 12 percent in 2001 to a high of 20 percent by 2016, before shifting down slightly to about 16 percent most recently.

The legal form of organization of businesses reflects many considerations and factors. While varied across industry, a mix of privately held and publicly traded companies arises from a fundamental tradeoff between a reduction in agency costs from being privately held (and mitigating conflicts between owners and managers), and the lower cost of accessing external finance from issuing publicly traded securities. Two other major factors are more time-varying and drive aggregate movements in the private equity share. The first relates to the cost of being publicly traded. One downside of the Sarbanes-Oxley Act is that it has raised the pecuniary and managerial costs of becoming (Kaserer, et al., 2011) or continuing as a publicly traded company (Mohan and Chen, 2007). This has had the unintended consequence of pushing more firms to remain private or to delist, and by reducing the potential returns for growing firms

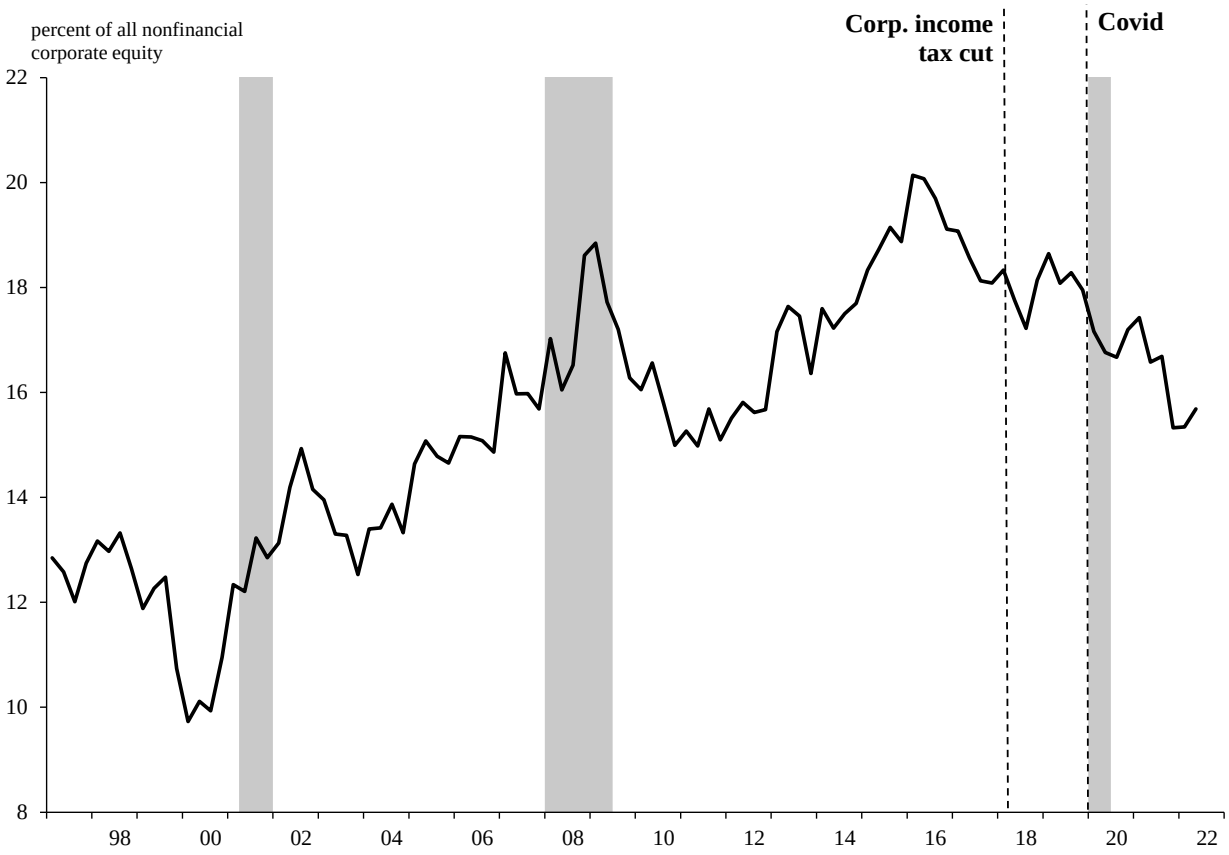

Figure 1: The Closely-Held (Private) Share of Nonfinancial Corporate Equity
(Source: *Financial Accounts of the U.S.*)

to become publicly traded. SOX has reduced the incentives from higher stock prices for venture capital investment (see Atkinson and Duca, 2019). Indeed, since the passage of SOX in July 2002, the private equity share of the nonfinancial corporate sector rose by nearly two-thirds from 2002 to 2016, from 12 to 20 percent.

Since then, the PE share receded to 16 percent, partly induced by a lowering of the tax incentive to be an S-corporation when the maximum corporate income tax rate was slashed in 2018. For firms that wish to distribute some profits as dividends, high corporate income taxes encourage them to classify as privately held S corporations which do not pay federal income tax on business income and benefit investors whose marginal federal income tax rate on S-corporation income is capped at the long-term capital gains tax rate.

Medium-run cyclical factors also affect the PE share. Because private equity is less liquid than publicly traded securities, the PE share is affected by investor perceptions of risk and the returns on safer long-term assets. When downside cyclical risks are low or real Treasury rates are low, investors prefer illiquid assets more and long-term Treasuries less as they reach for yield, sometimes induced by the risk-taking channel of monetary policy (see Becker and Ivashina, 2015; Chen, et al., 2019, Dell'Ariccia, et al., 2014 and 2017, and Hanson and Stein, 2015, *inter alia*). In addition, when real Treasury bond yields are low, it is less costly for a private equity fund to borrow against nonliquidated fund assets in order to smooth distributions to investors. While lower interest rates also lower the cost of non-S corporations to smooth dividends, the smoothing of distributions to investors is more important for PE funds than for non-S corporations as discussed later.

This study builds the above factors into an estimable time series model of the privately held share of nonfinancial corporate equity. Our results find significant roles of tax, regulatory, risk, and return factors in driving long-term shifts and short-term movements in the relative role of private versus public equity. To present our findings, the next section discusses related literature, while Section 3 lays out our empirical specification and variables. Estimation results are then reviewed and presented in Section 4, while Section 5 concludes by providing more perspective on our findings.

2. Related Literature

The legal form of organization of companies reflects many considerations and factors. And while some highly successful firms had "graduated" from private startups to large publicly traded companies (such as the tech giants), there is evidence that U.S. firms are strategic and forward-

looking in selecting their form of organization which tends to have a good deal of persistence (see Cole and Sokolyk, 2022).

Much of that persistence reflects ongoing tradeoffs in choosing to be a privately versus publicly held firm concerns tradeoffs involving asymmetric information and liquidity. One benefit from being privately held may ameliorate agency problems posed by separating ownership from control (see Jensen, 1989, and Phalippou, 2009, *inter alia*)—and thus potentially pose efficiency gains in the form of higher returns (see Harris, et al., 2014, *inter alia*). Conversely, being privately held poses higher costs of external finance because of the generally lower liquidity of private equity that results in higher liquidity premia (see Fanzoni, et al., 2012). The lower liquidity of private equity stems from partly being locked into long-term private equity commitments usually for up to 10 years (see Harris, et al., 2014, and Sorensen, et al. 2014) that expensive secondary market trading does not fully offset (Nadauld, et al., 2019). In addition, because private equity is more opaque largely owing to reporting requirements for publicly traded firms, privately held companies face higher external financing costs, consistent with Saunders and Steffin's (2011) findings on bank loan interest rates paid by UK firms. This fundamental tradeoff plus the economies of scale for being publicly traded and high fees paid to private equity fund managers[1] imply that, regulations permitting, some portion of companies will opt to be privately held corporations, which will reflect the industrial composition of the U.S. economy.

While the sectoral composition of the U.S. economy evolves, other factors affecting organizational form can change more quickly. Two major factors driving aggregate movements in the private equity share relate to taxation and the cost of being publicly traded. One concern about the Sarbanes-Oxley Act, is that it has raised the pecuniary and managerial (headache) costs of

[1] Investors pay sizable operating fees to PE fund managers, who, in addition, typically receive 20 percent of the returns above a target annual internal rate of return (see Phalippou, 2009).

becoming a public company (Kaserer, et al., 2011) or remaining public—partly by raising monitoring costs for remaining publicly listed (Mohan and Chen, 2007). This has had the unintended consequence of pushing more companies to remain private or to delist, and by reducing the potential returns for growing firms to potentially become publicly traded, SOX has reduced the incentives from higher stock prices for venture capital investment in the U.S. (see Atkinson and Duca, 2019). Indeed, since the passage of SOX in July 2002, the private equity share of the nonfinancial corporate sector increased by nearly two-thirds from 2002 to 2016, rising from 12 to 20 percent.

In recent years, part of that earlier rise receded in a way that is consistent with a major change in tax incentives. Specifically, because of pass-through provisions, S corporations do not pay federal income tax on business income like standard corporations or C corporations which are subject to entity-level taxation. Instead, that business income, deductions, and other tax considerations pass through to shareholders, whose marginal federal income tax rate on net income from S-corporations is capped at the long-term capital gains tax rate.[2] In principle, a publicly traded company could retain all profits and reinvest them in itself to provide shareholders with only low-taxed long-run capital gains. In that case, regular and S-corporations would be on a roughly equal tax footing. However, there can be losses of efficiency from trapping profits within companies and many investors value receiving some equity returns either out of liquidity concerns or because there is the remote risk that a company could later fail, in which case retained earnings are lost. In contrast, S-corporations can distribute the free cash to shareholders in a way that keeps taxes low. For this reason, the corporate income tax provides an incentive for shareholders to invest in S corporations to avoid the double-taxation of corporate profits. From this perspective, the large cut

[2] One downside is that investors are taxed when an S-Corporation earns net income, regardless of when distributions are made to PE fund investors.

in marginal corporate income tax rates that was passed in 2018 has reduced the incentive for private equity, which may help explain the nearly three percentage point fallback in the private equity share of nonfinancial corporate market value since the election of former President Trump, who campaigned on cutting corporate income taxes.

Because private equity is less liquid than publicly traded stock and because liquidity and default risk are positively correlated, private equity share are also potentially affected by investor perceptions of risk and the returns on safer long-term assets. More specifically, investors tend to be relatively more averse to less liquid alternative assets than to other assets when medium-term downside cyclical risks are high. Hence, indicators of business default risk or instances of financial crises are plausibly negatively related to the relative role of private versus public equity. In addition, there is evidence that, ceteris paribus, some investors tend to gravitate toward riskier assets when real interest rates are unusually low. Hence, a downward trend in real long-term interest rates could induce "reach for yield" effects, which may partly reflect the "risk-taking channel" of monetary policy (see, inter alia, Dell'Ariccia, et al., 2014, 2017, Becker and Ivashina, 2015; Chen, et al., 2019, Hanson and Stein, 2015). In addition, when real interest rates are low, it is less costly for a private equity fund to borrow to smooth distributions to investors during the typically long period when the fund is being liquidated. While lower interest rates also lower the cost of non-S corporations to smooth dividends, the smoothing of distributions to investors is more important for PE funds than for non-S corporations. For the former, investors are taxed less on distributions of fundamental returns. For the latter, tax considerations favor compensating investors with lower tax capital gains rather than dividends. For this reason, lower real interest rates enhance the appeal of PE relative to traditional corporate equity.

3. Modeling the Closely Held Share of U.S. Nonfinancial Corporate Equity

3a. Long-Run Factors Affecting the Private Equity Share of the Nonfinancial Corporate Sector

The literature points to both long-run and medium-term factors that could affect the relative share of closely held corporate equity. The double-taxation of dividends paid by publicly traded corporations encourages investors who prefer to receive dividends and companies which prefer not to reinvest retained earnings in their firms to become closely held corporate entities. Profit distributions from the later to equity holders are not subject to the corporate income tax and for individuals, the S corporation net income is taxed at the long-run capital gains tax rate. Because the marginal corporate income tax rate (shown in Figure 2) provides an incentive for firms to incorporate as C or S-class corporations, a higher rate induces a higher share of corporate equity that is closely held. The Sarbanes-Oxley Act (SOX) also provides an incentive for companies to be privately held. SOX has raised the compliance costs for firms to become or continue as a publicly traded corporation. For example, because publicly traded equity is more liquid than privately held equity,[3] this has reduced the potential payouts to venture capitalists to finance start-ups and middle-stage firms when they exit from such investments. Indeed, the stock-price elasticity of venture capital investment notably fell around the passage of SOX (see Atkinson and Duca, 2019).

In addition to these long-run factors, medium-run cyclical influences may also affect the trend in the closely held share of corporate equity. In securities markets, liquidity and default risk premia tend to rise in downturns. For example, the spread between the Baa corporate and 10-year Treasury yields is positively correlated with unemployment (see Bordo and Duca, 2022) and high

[3] Indeed, the *Financial Accounts of the United States* applies a 25% discount to closely held equity of nonfinancial corporations.

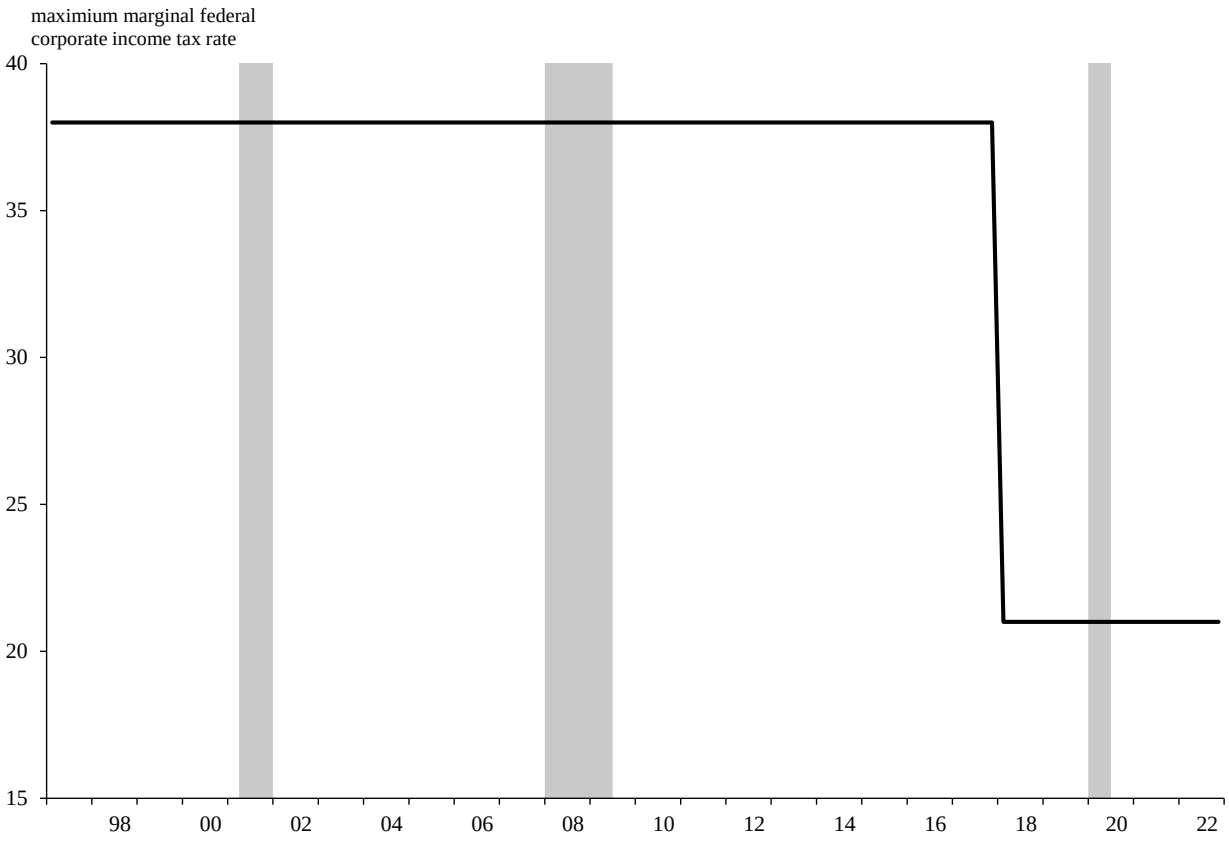

Figure 2: The Top Federal Corporate Income Tax Rate
(Source: Hutchins Tax Center, Brookings Institution)

levels of the excess bond premium is very much tied to the business cycle (Gilchrist and Zakrajsek, 2012). The relative liquidity of public versus private-held equity is similarly affected by long-term swings in the downside risk of companies. We experimented with several measures, and of these found that the delinquency rate on commercial and industrial (C&I) bank loans (*C&IDel*, Figure 3) contributed the most to explaining movements in the closely held share of corporate equity. This variable has the advantage of being closely related to the downside risk of a broad array of companies including those privately held. The timing of the variable also fits with the tendency of investors to be forward-looking insofar as movements in the delinquency rate tend to occur ahead of actual loan losses.

There is also ample evidence that low real interest rates induce riskier investment by banks (Dell'Ariccia, et al., 2014, 2017) and investors (Becker and Ivashina, 2015; Chen, et al., 2019, Hanson and Stein, 2015). For longer duration assets such as corporate equity, long-term real interest rates proved more relevant than short-run real interest rates for tracking "reach for yield" effects or those of the risk-taking channel of monetary policy. Specifically, we use the 5-year Treasury bond yield and 5-year expectations of inflation from the Michigan consumer sentiment survey to track time series movements in the real long-term (5-year) interest rate (*RTR5*), which is plotted in Figure 3.[4]

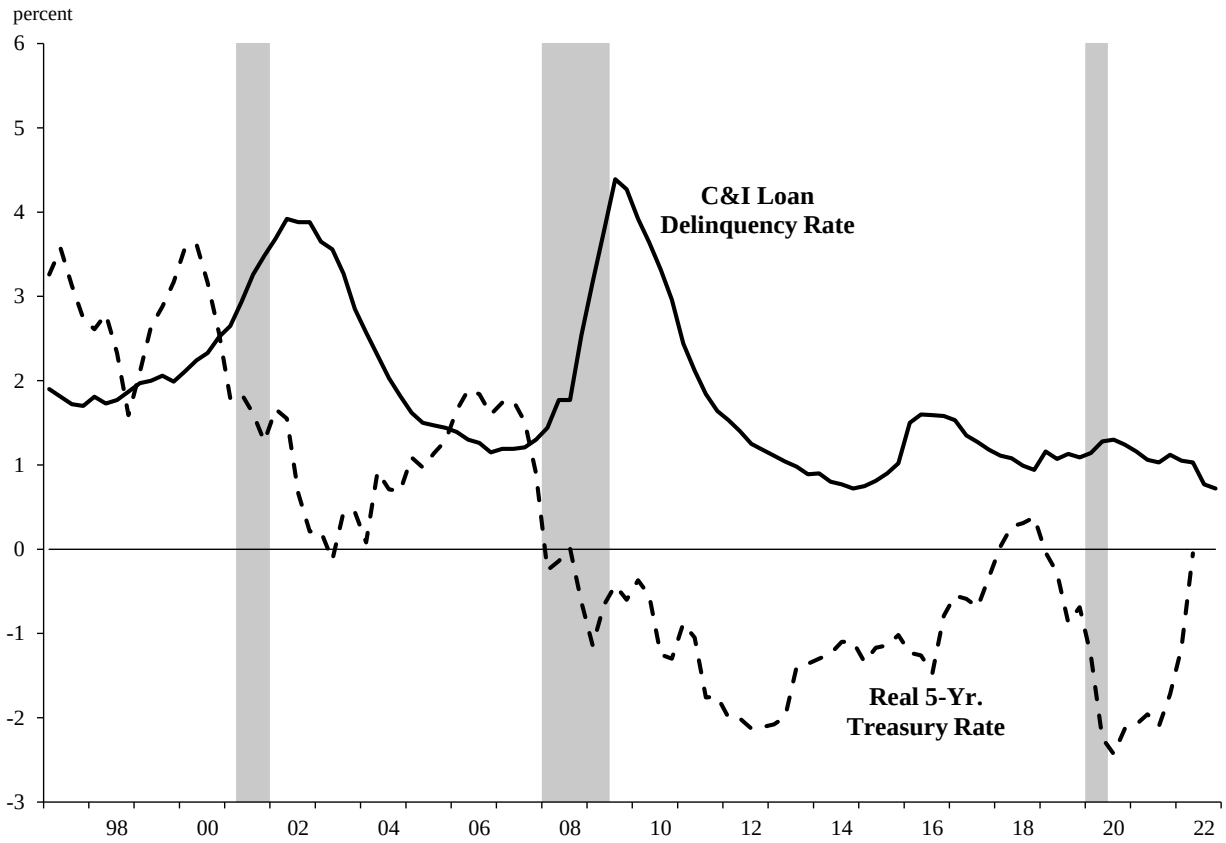

Figure 3: Business Loan Delinquency and Real 5-Year Treasury Interest Rates Equity
(Sources: Federal Reserve Board, University of Michigan Survey Research Center, and authors' calculations)

[4] In contrast to the Survey of Professional Forecasters, Michigan survey data cover our entire sample period.

3b. Long & Short-Run Models of the Private Equity Share of the Nonfinancial Corporate Sector

We model the PE share using a cointegration framework because desired changes in the legal form of organization take time to plan and enact. There are delays in the process of converting from one corporate form to another, and the choice of legal form of organization exhibits far-sighted expectations and planning insofar as the form is very persistent as shown by Cole and Sokolyk (2022).

Pulling together tax, regulatory, and risk factors, our long-run model of the PE share is:

$$\ln PEShare^{*}_{t} = \alpha_0 + \alpha_1 \ln CorpTax_t + \alpha_2 SOX_t + \alpha_3 \ln C\&IDel_t + \alpha_4 RTR5_t + \mu_t \qquad (1)$$

where *Corptax* is the highest marginal corporate income tax rate, *SOX* = 1 in 2003:q1 when the Sarbanes-Oxley Act took effect,[5] and the level of the real 5-year Treasury yield (*RTR5*) is used instead of its natural log owing to some negative values. Based on the prior discussion, we expect α_1 and $\alpha_2 > 0$, and α_3 and $\alpha_4 < 0$. Except for ln*C&IDel*, each of the variables in the long-run relationship (henceforth, "long-run variables") have unit roots (see Table 1). For a cointegrating vector of the size used, it is feasible to include one stationary variable (Phillips, 1995).

In the short-run, changes in the private equity share are driven by convergence toward long-run equilibrium tracked by an error-correction term and short-run exogenous shocks (X vector):

$$\Delta \ln PEShare_t = \beta_0 + \beta_1 EC_{t-1} + \sum \beta_{2i} \Delta PEShare_{t-i} + \sum \beta_{3i} \Delta \ln CorpTax_{t-i} + \sum \beta_{3i} \Delta SOX_{t-i} + \sum \beta_{4i} \Delta \ln C\&IDel_t + \sum \beta 5_{4i} \Delta\, RTR5_t + \beta_6 X_t + \varepsilon_t , \qquad (2)$$

where $EC \equiv \ln PEShare_t - \ln PEShare^{*}_{t}$, the lags of first differences of the long-term variables are selected using the AIC criterion, and β_6 is a row vector of coefficients on the short-run shocks in

[5] Atkinson and Duca (2019) find a time series break in the relationship between real stock prices and venture capital investment in the same quarter, which shortly followed the passage of SOX on July 30, 2002.

the column vector *X*. The error-correction coefficient β_1 should be negative and its absolute magnitude indicates the speed of adjustment at which changes in the PE share bring the log-level of the share back to equilibrium.

3c. Short-Run Shocks to the Private Equity Share of the Nonfinancial Corporate Sector

The set of exogenous short-run variables in the *X* vector are all 0-1 variables for unusual events that sparked large divergences in the prices of public versus closely held equity. For the full sample 1998:q1-2022:q2, the *X* vector includes two dummies for the first two quarters of the COVID pandemic, *D2020q2* and *D2020q3,* which only equal 1 in those respective quarters and 0 otherwise. The onset of the pandemic was marked by plunges in publicly traded stock prices accompanied by little change in the valuations of closely held equity. The latter could conceivably reflect the lack of instant mark-to-market pricing of closely held equity and/or the targeting of PPP job subsidies to small firms (favoring S corporations over most publicly traded corporate equity).

Other short-run shocks stem from the Y2K century date change. There was a surge in profits and revenue at publicly traded, high tech firms ahead of the year 2000 as their customers raced to replace older existing information technology with newer versions not subject to built-in coding problems associated with digits for calendar years. Because private equity is not instantly marked to market, Y2K boosted public equity valuations relative to PE valuations, inducing a temporary drop in the PE share. That rise wore off in 2000 owing to negative payback effects on high tech stock revenues from the earlier front-loading of high-tech orders, which induced a collapse in high tech stock prices. To track this unusual effect, we tested the dummy variables, *DY2K1999q3* = 1 in 1999q3 and *DY2K1999q4* = 1 in 1999q4, and 0 otherwise. In our model, the positive payback effects on the PE share from the high tech bust occur through an upward error-correction of the PE share in 2000.

We also tested dummy variables for two surges in the PE share also occurred during meltdowns of two of the five large U.S. investment banks in the pre-subprime era. The first, *DBear*, equals 1 in 2008q1 when publicly traded stock prices plunged when Bear Stearns was on the verge of failing and equals -1 when prices recovered when Bear Stearns was acquired by the commercial bank JP Morgan. Combined with the initial plunge and then recovery in prices of publicly traded stocks and the lack of instant mark-to-market pricing of closely held equity, this episode imparted a big spike followed by a plunge in the PE share in 2008q1 and 2008q2, respectively. The second dummy, *DLehman*, equals 1 in 2008q4, the first quarter when prices of publicly traded stock prices bore the full brunt of Lehman's outright failure in late September 2008. Combined with the late-2008 plunge in those stock prices and the lack of instant mark-to-market pricing of closely held equity, this episode imparted a big spike in the PE share that took time to unravel.

Reflecting odd short-run valuation effects associated with the lack of mark-to-market prices of private equity, we expect positive coefficients on *D2020q2*, *D2020q3*, *DY2K1999q3*, *DY2K1999q4*, *DBear*, and *DLehman*. The last of the *X* vector shocks is a dummy variable, *GovtShut*, equal to 1 in 2013:q4 when the shutdown of the federal government created uncertainty that hurt investments in smaller firms and -1 in 2014q1 when the government reopened. Accordingly, we expect a negative coefficient on *GovtShut*.

4. Estimation Results

4A. Estimation Details and Long-Run Results

The estimation of long-run and short-run relationships based off equations. (1) and (2) is joint following Johansen (1995) and depends on the included exogenous short-run (*X* vector) factors. In general, we estimated a set of models that include a minimal number of short-run variables, and also models with additional highly relevant short-run factors as a robustness check

and to address concerns about the choice of such variables. Lag length was chosen to minimize the Akaike Information Criterion (AIC), and if possible, to also yield clean model residuals. The estimation allows for possible time trends in long-run variables without an independent time effect in the vector aside from measured factors.

Table 2 reports estimates of six models, for which we first review the long-run model results. Models 1 and 2 are estimated over a pre-COVID sample, with the former omitting all short-run shock variables and the latter including all non-COVID short-run controls. In both cases, a significant and unique cointegrating vector was identified with statistically significant coefficients on the SOX, delinquency rate, and real interest rate variables and with the expected signs. While the corporate tax rate variable had the correct sign, it was statistically insignificant. This, however, likely reflects an important drawback of the pre-COVID sample, which saw is little variation in the corporate income tax rate (see Figure 2). In contrast, while the full sample had over twice as long a subperiod when lower corporate income tax rates were in effect. Consistent with this short-sample interpretation, the log corporate income tax rate is statistically significant with the expected positive sign in all four full sample models, Models 3-6.

Among the full sample models, Model 3 omits any short-run controls—even for the onset of the pandemic. Lacking controls for any unusual outliers, a statistically significant and unique long-run relationship (cointegrating vector) could not be identified in Model 3. To that model, Model 4 adds the two COVID dummies which is sufficient for identifying a unique and statistically significant long-run relationship with each long-run driver at least marginally significant with the expected sign—which is the case for Models 5 and 6. To Model 4, Model 5 adds the two Y2K dummies and Model 6 further adds the two investment banking crisis variables and the dummy for the government shutdown. In the model with the full set of short-run controls all of the long-run

drivers of the private equity share are statistically significant, with the PE share increasing in the corporate income tax rate and SOX and decreasing in the business loan delinquency rate and the 5-year real Treasury interest rate.

The magnitudes of the coefficients on the long-run SOX, delinquency, and real interest rate are similar across the models that include some short-run controls, and the corporate tax rate effect is similar across the four full sample models. Of the models, Model 6 is the best fitting in the full sample in both the short- and long-runs, with the implied long-run equilibrium relationship lining up with and leading the actual private equity share, as shown in Figure 4. The size of the positive coefficient on *SOX* from the preferred Model 6 coupled with the 12 percent PE share in 2001,

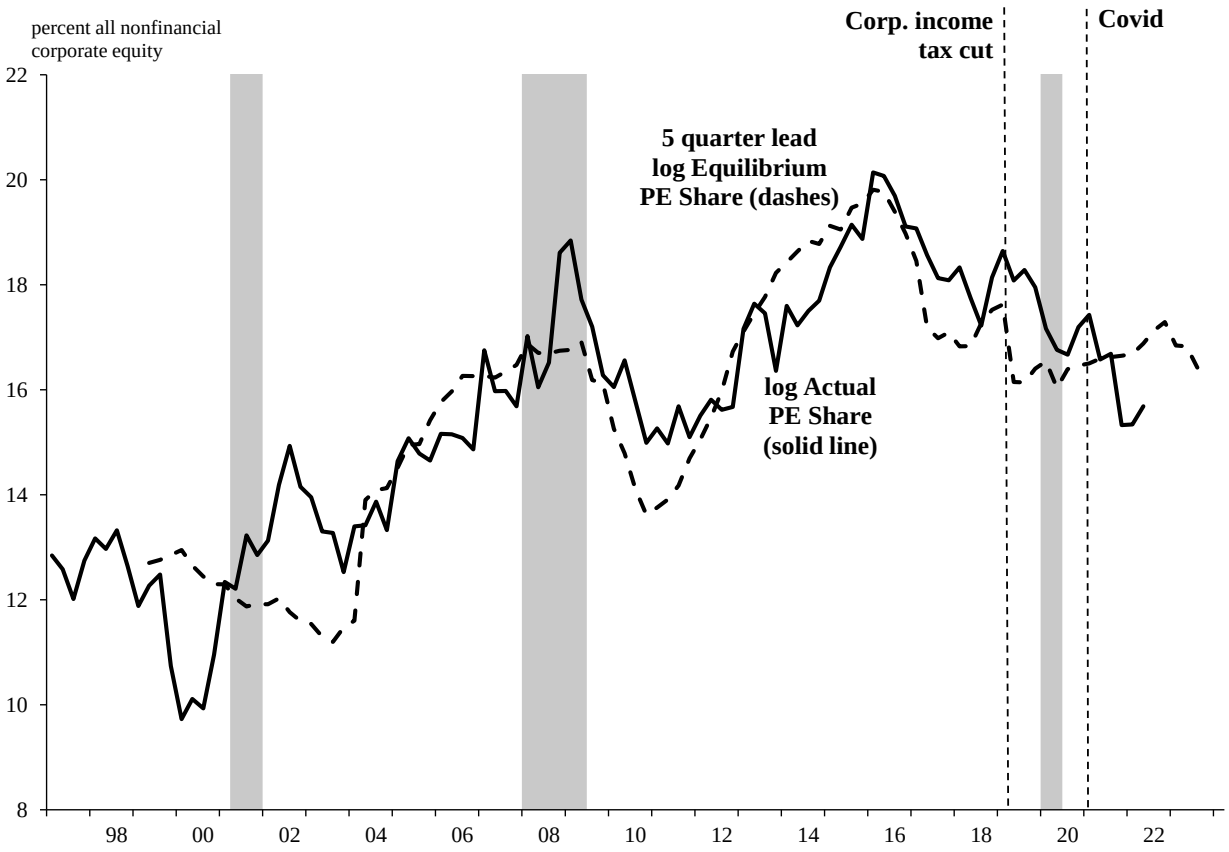

Figure 4: Implied Long-Run Equilibrium Trends with the Actual Closely Held Share of Corporate Equity
(Sources: Financial Accounts of the U.S. and authors' calculations)

implies that the Sarbanes-Oxley Act is associated with raising the PE share by about 2 percentage points. This accounts for one-half of the 4-percentage point rise between 2002 and 2022. On the other hand, the 2018 corporate income tax cut is associated with about a 1 percentage point decline in the PE share from its height of 20 percent in 2016.

4B. Short-Run Results

In every model of changes in the PE share, the error-correction term is significant with a negative sign indicating that changes in the PE share tend to move the level of the PE share towards its long-run equilibrium level. In the models with short-run controls, the error-correction term is significant at the 99 percent confidence level, with quarterly speeds of 23 to 31 percent across the models.

Reflecting their significance, the inclusion of short-run controls notably improves the corrected R-squares and standard errors for modeling changes in the PE Share across the two pre-pandemic models (Models 1 and 2) and across the full sample models (Models 3-6). By boosting the stock prices of publicly traded firms relative to the stock valuation of private equity, the pairs of Y2K, COVID, and investment bank crisis variables are positive and significant, as expected, while the federal government shutdown has the hypothesized negative effect. In addition, the inclusion of the short-run controls also helps eliminate serial correlation in the residuals for both the pre-pandemic and full samples. In the full sample models that include sensible Y2K and COVID controls, the long-run estimated coefficients are similar and imply similar long-run equilibrium levels.

5. Conclusion

The empirical literature on private equity has tended to focus on assessing the relative returns of private versus public equity or the cross-sectional impact of public to private buyouts on productivity, employment, and profits. This study helps fill a gap in the literature by modeling one aspect of the relative magnitude of private versus public equity, namely the closely held share of U.S. nonfinancial corporate equity. Specifically, we analyze what factors have driven short- and long-run movements in the relative share of nonfinancial firms that are privately instead of publicly held.

Reflecting the mix of factors that affect whether corporations are privately versus publicly held, we find roles for regulation, taxation, default risk, and the real long-run Treasury yield. In particular, time variation in the tax incentives to be publicly listed versus being an S corporation matter. In addition, the PE share tends to be higher the lower the general perceived stresses on business financial health, as proxied by the C&I loan delinquency rate, and the lower real long-term Treasury rates are. The latter result reflects tendencies for investors to "reach for yield" that are associated with the "risk-taking channel" of monetary policy. Finally, the Sarbanes-Oxley Act is also statistically linked to contributing to the rise of private equity consistent with concerns that SOX may have unduly increased costs of continuing as or becoming a publicly traded corporation. No single one of these factors is sufficient to model the trends in the PE composition of the U.S. nonfinancial corporate sector, which, although having risen over the past quarter century, has not monotonically increased. For example, our time series estimates indicate that the boost to private equity from low real long-term Treasury interest rates was more offset in recent years by the drop in the corporate income tax rate which lowered the tax incentive for corporations to be privately

held. In this way, our model accounts for why the actual PE share fell over 2018-2021 when real interest rates were low.

Looking ahead, other tax and organizational innovations plus potential shifts in the trend in long-term real Treasury yields and the risk of financing businesses will likely continue to affect the relative role of private equity in the U.S. corporate sector. Of course, there are other important trends in private equity worthy of inquiry that go beyond the aspects of private equity examined here. We leave these potential topics to future research.

Table 1: Unit Root Tests
(Data 1996:q4-2022:q2)

Unit Root		*KPSS*	bandwidth		*KPSS*	bandwidth
Yes*	ln*PE*	0.153*	6.49	Δln*PE*	0.055	4.38
Yes**	ln*CorpTax*	0.224**	6.86	Δln*CorpTax*	0.050	4.25
No	ln*C&IDel*	0.058	6.71	Δln*C&IDel*	0.036	6.07
Yes*	*RTR5*	0.156*	6.65	Δ*RTR5*	0.037	5.09
		DF-GLS	lag length		*DF-GLS*	lag len.
Yes**	ln*PE*	2.232	0	Δln*PE*	9.721**	0
Yes**	ln*CorpTax*	1.435	0	Δln*CorpTax*	10.310**	0
No	ln*C&IDel*	3.778	2	Δln*C&IDel*	3.346*	1
Yes**	*RTR5*	2.153	1	Δ*RTR5*	4.756**	0
		PP	bandwidth		*PP*	bandwidth
Yes**	ln*PE*	2.249	4	Δln*PE*	10.151**	2
Yes**	ln*CorpTax*	1.554	0	Δln*CorpTax*	10.236**	3
Yes**	ln*C&IDel*	2.560	7	Δln*C&IDel*	5.469**	5
Yes**	*RTR5*	2.116	7	Δ*RTR5*	7.516**	4

Notes: * and ** denote 95% and 99% significance levels, respectively. Lag lengths for the KPSS stationarity tests are based on the Newey-West bandwidth selector using a Quadratic Spectral kernel for the spectral estimation method (see Hobjin, et al. 2004). The combination of a significant KPSS stationary test statistic on the level of a variable (rejecting that it is stationary) and a significant test statistic on its first difference (accepting it is stationary) is evidence against trend stationarity. Unit root tests include a time trend. The sample for the unit root tests cover 1996:q4-2022:q2, which matches the time span of the data on the PE share and other long-term variables used to estimate the models in Table 2 that include four lags of the first differences of the variables in the cointegrating vector.

Table 2: Quarterly Models of the Closely-Held Share of Nonfinancial Corporate Equity, 1998q1-2022q2

Long-Run Equilibrium: $\ln PE^*_t = \alpha_0 + \alpha_1 \ln CorpTax_t + \alpha_2 SOX_t + \alpha_3 \ln C\&IDel_t + \alpha_4 RTR5_t + \mu_t$

Sample:	Pre-Pandemic, 1998-2019q4		Full Sample Period, 1998q1-2022:q2			
Model No.	1	2	3	4	5	6
short-run controls	None	All nonCovid	None	Covid	Covid & Y2K	All
Constant	2.2679	2.7683	2.1289	2.0464	2.0632	2.1710
ln $CorpTax_{t-1}$	0.1275	0.1034	0.1597*	0.1742**	0.1748**	0.1523**
	(1.05)	(0.88)	(2.24)	(2.67)	(2.84)	(6.14)
SOX_{t-1}	0.1735**	0.1228*	0.1917**	0.2339**	0.2057**	0.1687**
	(3.55)	(2.56)	(4.16)	(5.45)	(4.96)	(4.10)
ln $C\&IDel_{t-1}$	-0.2185**	-0.2009**	-0.2021**	-0.2065**	-0.2002**	-0.1979**
	(5.59)	(5.28)	(5.41)	(5.94)	(6.10)	(6.14)
$RTR5_{t-1}$	-0.0233+	-0.0316*	-0.0264*	-0.0199+	-0.0200+	-0.0251*
	(1.81)	(2.49)	(2.18)	(1.79)	(1.91)	(2.43)
unique coint.	Yes*	Yes*	Weak+	Yes*	Yes**	Yes**
vec. # lags	4	4	4	4	4	4
trace no vec.	69.92*	73.60*	66.33+	74.12*	79.10**	83.27**
trace only 1 v.	32.58	34.66	30.60	31.44	32.30	35.13

Modeling Short-Run Changes

$$\Delta \ln PE_t = \beta_0 + \beta_1 EC_{t-1} + \sum \beta_{2i} \Delta lnPE_{t-i} + \sum \beta_{3i} \Delta \ln CorpTax_{t-i} + \sum \beta_{3i} \Delta SOX_{t-I} + \sum \beta_{4i} \Delta \ln C\&IDel_t + \sum \beta 5_{4i} \Delta RTR5_t + \beta_6 X_t + \varepsilon_t$$

EC_{t-1}	0.252**	0.241**	0.234**	0.287**	0.309**	0.274**
adjust. speed	(3.87)	(4.10)	(3.31)	(4.28)	(5.06)	(5.01)
$\Delta lnPE_{t-i1}$	0.029	0.095	0.120	0.067	0.002	0.055
	(0.24)	(0.89)	(1.06)	(0.62)	(0.02)	(0.61)
Δln $CorpTax_{t-1}$	-0.011	-0.004	-0.030	-0.055	-0.050	-0.031
	(0.14)	(0.06)	(0.35)	(0.68)	(0.69)	(0.49)
ΔSOX_{t-1}	-0.072	-0.048	-0.071	-0.085+	-0.066	-0.042
	(1.56)	(1.18)	(1.70)	(1.81)	(1.56)	(1.13)
Δln $C\&IDel_{t-1}$	-0.020	0.012	-0.038	-0.036	-0.016	0.013
	(0.31)	(0.21)	(0.57)	(0.58)	(0.28)	(0.26)
$\Delta RTR5_{t-1}$	0.012	0.024+	0.004	-0.004	0.004	0.015
	(0.79)	(1.78)	(0.27)	(0.30)	(0.32)	(1.30)
DY2K1999q3	-0.155**	-0.171**			-0.143**	-0.158**
	(3.26)	(4.11)			(3.34)	(4.19)
DY2K1999q4	-0.132**	-0.139**			-0.136**	-0.138**
	(2.70)	(3.23)			(3.09)	(3.57)

Sample:	Pre-Pandemic 1998-2019q4			Full Sample Period, 1998q1-2022:q2		
Model No.	1	2	3	4	5	6
D2020q3 (COVID)				0.110* (2.37)	0.101* (2.46)	0.089* (2.45)
D2020q3 (COVID)				0.117* (2.47)	0.118** (2.79)	0.116** (3.16)
DBear		0.066* (2.32)				0.067* (2.61)
DLehman		0.120** (2.70)				0.124** (3.17)
GovtShut		-0.078** (2.80)				-0.074** (2.91)
Adj. R^2	0.237	0.421	0.083	0.179	0.338	0.495
S.E.x10	0.427	0.372	0.459	0.434	0.390	0.341
VEC Auto (1)	15.18	16.93	16.53	18.16	15.48	16.68
VEC Auto (2)	23.83	18.31	23.61	54.36**	44.04*	23.98
VEC Auto (3)	18.22	17.78	15.61	27.29	18.71	20.15
VEC Auto (4)	33.97	19.49	19.46	19.95	29.69	13.31

Notes: (i) Absolute t-statistics in parentheses. ** (*) significant at the 99% (95%) confidence level. (ii) Long-run: Maximum likelihood estimates of the long-run equilibrium relationship using a five-equation system with at most one cointegrating vector. (iii) $EC_{t-1} = lnPE_{t-1} - \alpha_0 - \alpha_1 \ln CorpTax_{t-1} - \alpha_2 SOX_t - \alpha_3 \ln C\&IDel_t - \alpha_4 RTR5_t$. (iv) First difference terms of elements in the long run cointegrating vector. (v) Lag lengths chosen to minimize the AIC criterion. (vi) significance of the trace and VEC Auto statistics reflects lag length and if a time trend is included in the long run.

References

Aramonte, Sirio and Fernando Avalos. 2021. “The Rise of Private Markets.” *BIS Quarterly Review* December, 69-82.

Atkinson, Tyler and John V. Duca. 2019. “Venture Capital Restrained After Sarbanes-Oxley.” *Applied Economics Letters* 175, 84-87.

Becker, Bo, and Victoria Ivashina. 2015. “Reaching for Yield in the Bond Market.” *Journal of Finance* 70(5), 1863–1902.

Bordo, Michael D. and John V. Duca. 2022. “How New Fed Corporate Bond Programs Cushioned the Covid-19 Recession.” *Journal of Banking and Finance* 136: 1-22.

Chen, Lian, Yueran Ma, and Carmen Wang, 2019. “Low Interest Rates and Risk-Taking: Evidence from Individual Investment Decisions.” *Review of Financial Studies* 32(6), 2107-2148.

Cole, Rebel A. and Tatyana Sokolyk. 2022. “How Do Firms Choose Legal Form of Organization?” Manuscript, Florida Atlantic University and Brock University.

Cumming, Douglas, Peter Rejo, and Monika Tarsalewska. 2020. “Public-to-Private Buyouts and Innovation.” *British Journal of Management* 31, 811-29. DOI: 10.1111/1467-8551.12404

Dell’Ariccia, Giovanni, Luc Laeven, and Robert Marquez. 2014. “Real Interest Rates, Leverage, and Bank Risk-Taking.” *Journal of Economic Theory* 149(0), 65 – 99.

Dell-Ariccia, Giovanni, Luc Laeven, and Gustavo A. Suarez. 2017. “Bank Leverage and Monetary Policy’s Risk-Taking Channel: Evidence from the United States.” *Journal of Finance* 72(2) 613-54.

Franzoni, Francesco, Eric Nowak and Ludovic Phalippou (2012): "Private Equity Performance and Liquidity Risk." *Journal of Finance* 67(6): 2341–73.

Gambacorta, Leonardo. 2009. "Monetary Policy and the Risk-Taking Channel." *BIS Quarterly Review* (December), 43–53.

Gilchrist, Simon and Egon Zakrajsek. 2012. "Credit Spreads and Business Cycle Fluctuations." *American Economic Review* 102 (4): 1692-1720.

Gornall, W., Strebulaev, I.A., (2015), "Economic Impact of Venture Capital: Evidence from Public Companies," Stanford Business School Working Paper No. 3362, November.

Hanson, Samuel G., and Jeremy C. Stein. 2015. Monetary Policy and Long-Term Real Rates. *Journal of Financial Economics* 115:429–448.

Jensen, Michael. 1989. "The Eclipse of the Public Corporation." *Harvard Business Review* 67: 61–74.

Kaplan, Steven N. 1991. "The Staying Power of Leveraged Buyouts." *Journal of Financial Economics* 29, 287–313.

Kaserer, Christoph., Mettler, Alfred, and Obernberger, Stefan. 2011. "The Impact of the Sarbanes-Oxley Act on the Cost of Going Public." *Business Research* **4**, 125–147.

Kozeniauskas, Nicholas (2017), "What's Driving the Decline in Entrepreneurship," manuscript, New York University, November 16, 2017.

McKinsey and Company. 2022. *McKinsey Global Private Markets Review 2022*. McKinsey: New York.

Phalippou, Ludovic. 2009. "Beware of Venturing Into Private Equity." *Journal of Economic Perspectives* 23: 147-66.

Phillips, Peter C.B. 1995. "Fully Modified Least Squares and Vector Autoregression." *Econometrica* 63(5): 1023-1078.

Saunders, Anthony and Sascha Steffen. 2011. “The Costs of Being Private: Evidence from the Loan Market.” *Review of Financial Studies* 24(12):4091-4122.