Analysis of the Relation between Treasury Stock and Common Shares Outstanding

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Abstract

This study attempts to examine the relation of treasury stock to total shares outstanding in the US. We examine if this relation exists on annual basis in the period 1959 to 2016. We use cointegration analysis and estimate a vector error correction model (VECM) of this relation. We find that there is a steady increase of treasury stock as a proportion to shares outstanding starting in the 80s. We also document that both shares outstanding and treasury stock are non-stationary. Because the series are integrated we use cointegration analysis and make a first attempt at representing the relation between treasury stock and shares outstanding with a statistical model. It is well documented in the literature that US companies have started using share repurchases instead of dividends to reward shareholders in the 80s. However, the relation of shares outstanding and treasury stock has not been examined. This study attempts to fill this void in the literature, which can help corporate finance managers and academics in their quest to improve payout policy.

Keywords: treasury stock, shares outstanding, cointegration, VECM
JEL Classification: G30, G35

1. Introduction

In this study we examine the relation of treasury stock to the company‘s total shares outstanding. It is well documented in the literature that share repurchases have substituted dividends as the preferred method for returning cash back to shareholders (Masulis, 1980; Jagannathan, Stephens and Weisbach, 2000; Dittmar, 2000). It is also documented that share repurchases can be a pricing factor (Boudoukh, Michaely, Richardson and Roberts, 2007).

When a company buys back shares in open markets these shares get accumulated in treasury stock and thus reduce the number of shares outstanding of the firm. An alternative way of getting treasury stock is at the initial public offering (IPO) when firms might not issue all approved shares to be issued, which also are retained as treasury stock. Treasury stock have no voting rights and do not pay dividends. Treasury stock can be added back into the shares outstanding of the firm when the firm sells them back in the open market, or when the treasury stock is given as compensation to employees or shareholders in the form of stock dividend.

In comparison, shares outstanding are the shares held in the open market and held outside of the company that issued them. Shares outstanding are created at IPO. The number of shares outstanding obviously can fluctuate because of seasoned equity offerings, stock dividends, employee compensation and share repurchases. Therefore, there is a direct link between shares outstanding and treasury stock, which requires further examination and which we attempt to perform in this study.

We document that both shares outstanding and treasury stock are integrated but also that there is a steady increase of treasury stock as a proportion to shares outstanding in the examined period 1959 to 2016. We also find that despite integrated a relation can be expressed formally between shares outstanding and treasury stock and make a first attempt, to the best of our knowledge, at representing it by a statistical model.

2. Literature Review

Masulis (1980) finds capital structure and capital distribution reasons for stock repurchases by firms. Similarly, Dittmar (2000) studies stock repurchases and the motivation of firms to conduct them in the period 1977-1996. He finds that firms choose to repurchase their own stock is when the firm believes its stock is undervalued or to distribute back capital. However, he finds also that these are not the only reasons for stock repurchases, he documents that firms repurchase shares to alter their capital structure. Jagannathan, Stephens and Weisbach (2000) study why firms choose to use repurchases rather than dividends and finds that repurchases provide firms with more flexibility and as such are prefered by firms with higher temporary non-operating cash-flows whereas dividends are prefered by firms with higher permanent operating cash-flows.

Besides corporate finance objectives firms buy and sell their stock for market-microstructure reasons too. De Cesari, Espenlaub and Khurshed (2011) study treasury stock and common shares outstanding activities and their effects on common stock prices in Italy. They choose to study Italy rather than the US because of the greater freedom of companies to buy and sell their own stock relative to the US and other developed countries. They point out that in Italy a company can repurchase up to 10% of fully paid shares outstanding and can last up to 18 months. In the US repurchases are authorized and managed by the firm's board of directors without any time limits. However, stock repurchases in the US are subject to much more strict insider trading and stock manipulation laws than Italy, which makes the Italian repurchase programs less restrictive. They find that the buying and selling of own company shares improve the liquidity of their stock and reduce their volatility. In a separate strand of the repurchase literature, Boudoukh, Michaely, Richardson and Roberts (2007) show that incorporating repurchases into the payout yield in addition to dividends improves asset pricing models.

What all these studies suggest is that own stock repurchases and sales by the firm are an important factor, which needs special attention. What the literature has not addressed so far is what relation does the buying and selling of the own stock have with the total shares outstanding of the firm. We attempt to fill this void in the literature by addressing the question – is a company's treasury stock related somehow to the company's shares outstanding?

3. Methodology

Since this is time-series based study we first employ standard Augmented Dickey Fuller and Phillips-Perron Unit Root tests to examine stationarity. Both tests have null hypothesis of unit roots. This is necessary to establish stationarity and be able to conduct simple ANOVA, correlation and regression analysis. Due to the prior literature establishing that the series are most likely integrated we rely on the Granger representation theorem (Engle and Granger, 1987), which states that when two series are integrated a cointegration of order k can be estimated for their relation. We use the Johansen Cointegration Test to establish the rank of cointegration and a vector error correction model VECM(p) to estimate a fitting model for this relation. A VECM(p) with the cointegration rank r<=k can be expressed as:

$$\Delta y_t = \delta + \Pi y_{t-1} + \sum_{i=1}^{p-1} \Phi_i^* \Delta y_{t-i} + \varepsilon_t \,, \qquad (1)$$

where Δ is the difference operator, $\Pi = \alpha\beta'$, where α and β are k*r matrices and α is the adjustment coefficient and β is the long-run parameter.

We use the Akaike Information Criterion (AIC) and Schwarz Bayesian Criterion (SBC) for the selection of the most parsimonious model to represent the relation between shares outstanding and treasury stock. AIC measures the relative quality of statistical models by controlling for the number of variables used in each competing model. It also estimates the quality of each model, relative to other model-candidates. Similarly, SBC controls for number of parameters used. Both AIC and SBC introduce a penalty term for the number of parameters in each model-candidate - the penalty term is larger in SBC than in AIC, thus making SBC the more conservative criterion. The lower AIC and SBC the more parsimonious the model.

4. Data and Analysis

The data in this study are from the Center for Research in Security Prices (CRSP) at the University of Chicago. The data are annual and span the period 1959 to 2016.

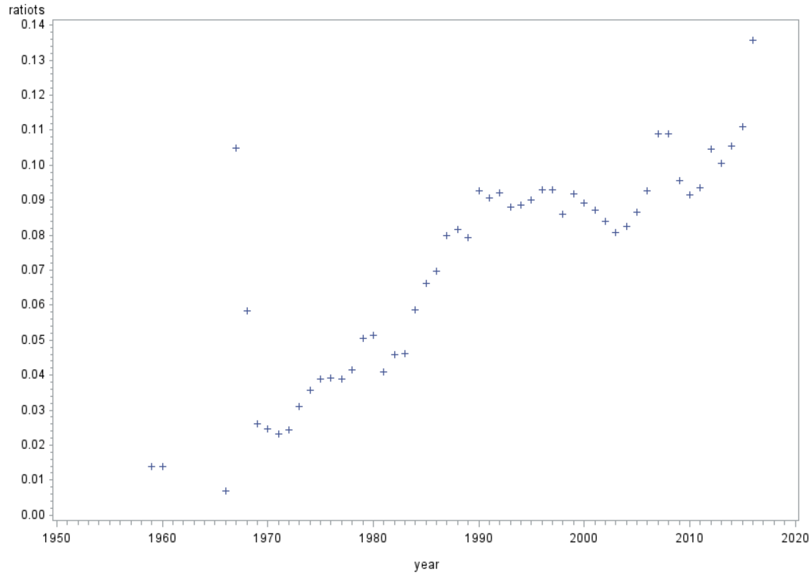

Figure 1. Ratio of treasury stock to total shares outstanding(1959-2016)

Figure 1 presents the ratio of treasury stock to total shares outstanding in the examined period. Clearly, there is a steady increase of treasury stock accumulated by companies in the US as a proportion to shares outstanding. This is consistent with the findings of Fama and French (2001) and Grullon and Michaely (2002) that companies have started reducing dividend payouts in the 80s and substituting them with stock repurchases. Figures 2 and 3 show that individually, both total shares outstanding and total treasury stock are non-stationary and exhibit sharp positive trends.

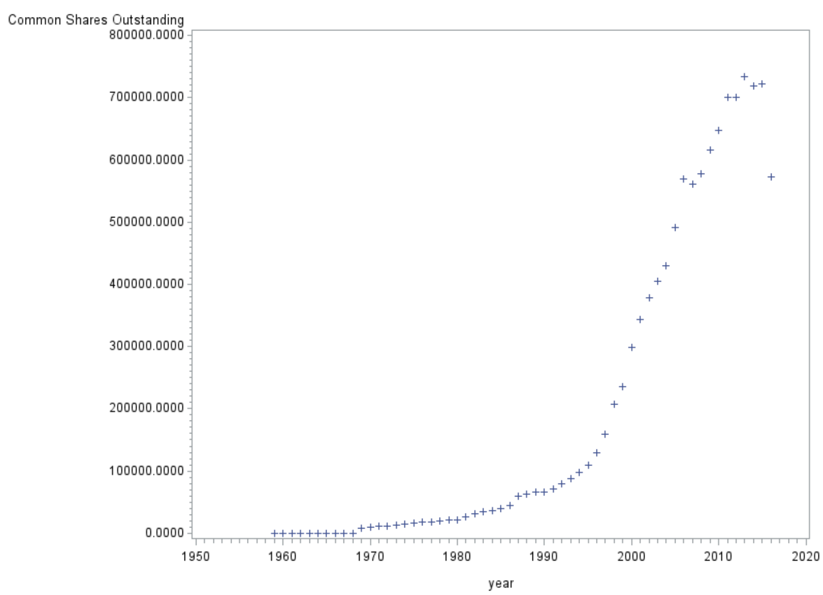

Figure 2. Total Number of Shares Outstanding, Yearly.

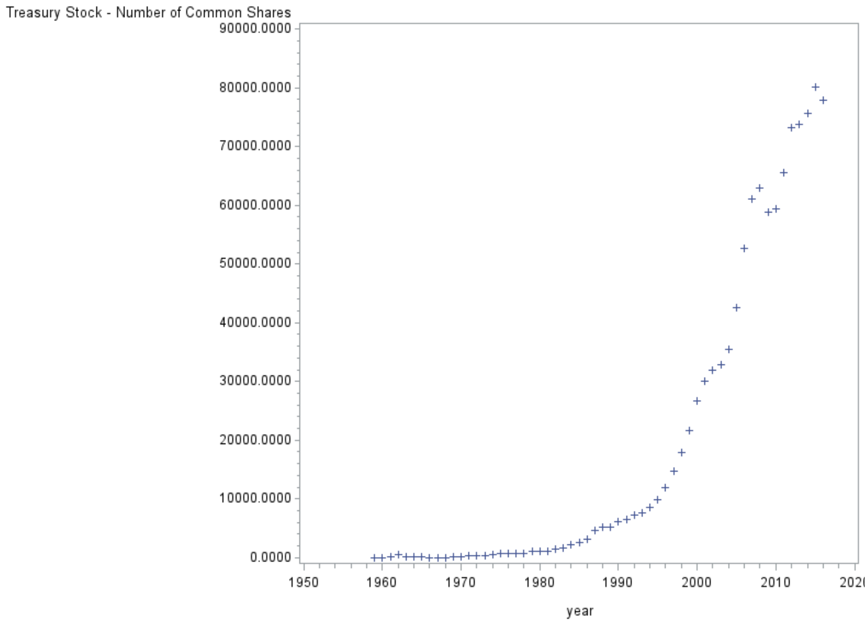

Figure 3. Total Number of Treasury Stock, Yearly.

Table 1. Summary Statistics

	N	Mean	St Dev	Min	Max
tso	58	194686	251656	1.941	734576
tts	58	18750.1	26075.5	0.027	80064.4

Note: tso is total shares outstanding and tts is total treasury stock.

Even though visually convincing, as standard in the cointegration analysis methodology, we first formally test for the presence of unit roots. We employ standard Augmented Dickey Fuller and Phillips-Perron Unit Root tests, which both have null hypothesis of unit roots. Table 2 reports results of the unit root tests. Both tests fail to reject the null hypothesis of unit roots in total shares outstanding and total treasury stock for the zero mean, single mean and trend model specifications. Considering that both shares outstanding and treasury stock series are non-stationary we cannot use simple correlation analyis to draw conclusions since correlation coefficients on non-stationary data are meaningless. However, non-stationarity among two series can be studied with the methods of cointegration. The fact that both shares outstanding and treasury stock are non-stationary we can use the Granger representation theorem (Engle and Granger, 1987) to formally test for cointegration between the two series.

Table 2. Unit Root Tests

		Dickey-Fuller Unit Root Tests				**Phillips-Perron Unit Root Test**			
	Type	**Rho**	**Pr < Rho**	**Tau**	**Pr < Tau**	**Rho**	**Pr < Rho**	**Tau**	**Pr < Tau**
tso	**Zero Mean**	-3.70	0.18	-0.92	0.31	1.36	0.95	1.67	0.98
	Single Mean	-4.39	0.48	-1.25	0.64	0.40	0.97	0.40	0.98
	Trend	-8.56	0.51	-1.79	0.70	-2.95	0.94	-1.53	0.81
tts	**Zero Mean**	2.03	0.99	1.21	0.94	2.93	1.00	4.15	1.00
	Single Mean	1.07	0.99	0.63	0.99	2.19	1.00	2.59	1.00
	Trend	-2.99	0.93	-1.27	0.89	-0.79	0.99	-0.53	0.98

Note: tso is total shares outstanding and tts is total treasury stock.

Thus, we next proceed with formally testing for cointegration between the two series of shares outstanding and treasury stock. Table 3 reports the Johansen Cointegration Test results on the two series. Panel A displays the unrestricted test and Panel B the restricted test. Both test results suggest rejection of no-cointegration. The unrestricted model suggests that the two series are cointegrated at a rank of at least one. Naturally, since there are only two variables technically the rank cannot be higher than one.

Table 3. Johansen Trace Cointegration Test Results

Panel A. Cointegration Rank Test Using Trace

H0: Rank=r	H1: Rank>r	Eigenvalue	Trace	Pr > Trace	Drift in ECM	Drift in Process
0	0	0.4666	37.86***	<.0001	Constant	Linear
1	1	0.0824	4.55**	0.0326		

Panel B. Cointegration Rank Test Using Trace Under Restriction

H0: Rank=r	H1: Rank>r	Eigenvalue	Trace	Pr > Trace	Drift in ECM	Drift in Process
0	0	0.4675	38.07***	0.0001	Constant	Constant
1	1	0.0844	4.67	0.3215		

Note: ***, **, * represent statistical significance at the 1, 5 and 10% confidence level.

Considering that the series are cointegrated the next step in the analysis is to estimate a VECM as expressed in equation (1). We use the AIC and SBC information criteria for the selection of the most parsimonious model. Table 4 presents the estiamtes of the most parsimonious vector error correction model of the total shares outstanding and total treasury stock series, which has AIC of 34.10 and SBC of 34.90.

Table 4. Model Estimates

Equation	Parameter	Estimate	Pr > |t|	Variable
D_tso	**CONST1**	3370.18	0.46	1
	AR1_1_1	-0.32		tso(t-1)
	AR1_1_2	2.86		tts(t-1)
	AR2_1_1	0.92***	0.00	D_tso(t-1)
	AR2_1_2	-0.86	0.74	D_tts(t-1)
	AR3_1_1	0.82***	0.01	D_tso(t-2)
	AR3_1_2	-16.62***	0.00	D_tts(t-2)
	AR4_1_1	0.72**	0.02	D_tso(t-3)
	AR4_1_2	10.74***	0.00	D_tts(t-3)
	AR5_1_1	0.75**	0.02	D_tso(t-4)
	AR5_1_2	-11.87***	0.00	D_tts(t-4)
D_tts	**CONST2**	-360.54*	0.10	1
	AR1_2_1	0.06		tso(t-1)
	AR1_2_2	-0.56		tts(t-1)
	AR2_2_1	0.02	0.26	D_tso(t-1)
	AR2_2_2	0.89***	0.00	D_tts(t-1)
	AR3_2_1	-0.02	0.17	D_tso(t-2)
	AR3_2_2	-0.61***	0.00	D_tts(t-2)
	AR4_2_1	-0.04***	0.00	D_tso(t-3)

	AR4_2_2	0.65***	0.00	D_tts(t-3)
	AR5_2_1	-0.03*	0.10	D_tso(t-4)
	AR5_2_2	-0.32***	0.00	D_tts(t-4)

Note: tso is total shares outstanding and tts is total treasury stock. ***, **, * represent statistical significance at the 1, 5 and 10% confidence level.

Therefore, the fitted vector error correction model of the relation between treasury stock and shares outstanding as represented in equation (1) can be expressed as:

$$\Delta y_t = \begin{matrix} 3370.18 \\ -360.54 \end{matrix} + \begin{pmatrix} -0.32 & 2.86 \\ 0.06 & -0.56 \end{pmatrix} y_{t-1} + \begin{pmatrix} 0.92 & -0.86 \\ 0.02 & 0.89 \end{pmatrix} \Delta y_{t-1} + \begin{pmatrix} 0.82 & -16.62 \\ -0.02 & -0.61 \end{pmatrix} \Delta y_{t-2}$$
$$+ \begin{pmatrix} 0.72 & 10.74 \\ -0.04 & 0.65 \end{pmatrix} \Delta y_{t-3} + \begin{pmatrix} 0.75 & -11.87 \\ -0.03 & -0.32 \end{pmatrix} \Delta y_{t-4} + \varepsilon_t$$

Table 5 shows the long-run and adjustment coefficients for the relation between shares outstanding and treasury stock. The table shows that the cointegrating vector is $\hat{\beta} = (1, -9.07)'$, which suggests that the long-term relation between shares outstanding and treasury stock can be represented by the following equation: TSO = 9.07 TTS.

Table 5. Long Run and Adjustment Coefficients Table

Long-Run Parameter Beta Estimates When RANK=1	
Variable	**1**
tso	1
tts	-9.07
Adjustment Coefficient Alpha Estimates When RANK=1	
Variable	**1**
tso	-0.32
tts	0.06

The tests on residuals show that both treasury stock and shares outstanding are normaly distributed but that shares outstanding have ARCH effects, as shown in Table 6.

Table 6. White Noise Tests on Residuals

Univariate Model White Noise Diagnostics					
Variable	**Durbin**	**Normality**		**ARCH**	
	Watson	**Chi-Square**	**Pr > ChiSq**	**F Value**	**Pr > F**
tso	1.5172	0.4900	0.7810	12.2100	0.0011
tts	2.3039	1.2900	0.5260	0.0400	0.8487

5. Conclusion

In this study, we examine on annual basis the relation of treasury stock to the company‘s total shares outstanding in the US in the period 1959 to 2016. We document that both shares outstanding and treasury stock are integrated but also that there is a steady increase of treasury stock as a proportion to shares outstanding. This is consistent with the findings of Fama and French (2001) and Grullon and Michaely (2002) that companies have started decreasing their use of dividends as a form of payouts in the 80s and have started substituting dividends with stock repurchases. We also find that even though integrated a relation does exist between shares outstanding and treasury stock and make a first attempt at representing it by a statistical model.

A natural limitation of the study is the use of annual US data. In a future study, if higher frequency data, for international markets, become available on these variables the authors plan to extend this study and test if such a relation exists at the higher frequency level and around the world.

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