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The Persistence of Accounting versus Economic Profit

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Abstract

Drawing on Schumpeterian theory, this article presents estimates of a first-order autoregressive model of profit persistence for large US firms, using Economic Value Added (EVA), the popular measure of profits produced by Stern Stewart and Company, and simple (unadjusted) accounting measures from the Compustat database. We hypothesize about the differences we should expect to find between these two sets of estimates, and also provide a fresh normative assessment of the dynamic competitiveness of the US economy.

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1 Introduction

Dennis Mueller (1977, 1986, 1990) initiated what has by now become a fairly large, mainly empirical literature that seeks to make a normative evaluation of the *dynamic* efficiency of the market economy. Rather than taking it for granted that the economy is in long-run equilibrium at every moment, this (Schumpeterian) literature seeks to measure the speed of the transition to competitive equilibrium, as well as to determine if long-run firm behavior is consistent with such an equilibrium. There are now more than a dozen economies for which persistence estimates are available,[2] and there will soon be larger scope for finding socioeconomic and institutional determinates of persistence.

However, the accounting measures that are almost universally used in these studies are known to be subject to many types of measurement error.[3] We must therefore address the measurement issue before any comparative institutional analysis can occur. Several of the recent contributions to the persistence literature have advanced the econometric theory behind the analysis,[4] but, fewer studies have analyzed these measurement issues.[5] Moreover no study has explored persistence using economic value added (EVA), the popular measure of profits produced by Stern Stewart and Company. Our main contribution is to pit EVA against unadjusted accounting measures in an econometric horserace.

The race our data will run is the first-order autoregressive model—the "AR(1)" –which has been the workhorse empirical model in the persistence of profits literature. This model can also serve as a reduced form representation of a structural model of market competition (Geroski, 1990a). The resulting estimates of the AR(1) model allow the researcher to calculate 1.) if, and at what speed, profits converge onto the normal level, 2.) the long-run projected value of profits, and 3.) the model's goodness of fit.

These three values can then be used to shed light onto three different views of competition, with zero long-run profits as the neoclassical ideal, modest persistence as the classical ideal, and a low R^2 as the ecological ideal (Geroski, 1990, pp. 15-28). Our estimates (and any other estimates of the AR(1) profits equation,) therefore shed light on dynamic competitiveness in terms of each of these three views of competition.

Authors who employ unadjusted accounting measures often argue that the bias is not large or systematic, and so their estimates (at least on average) reflect an accurate view of actual competitiveness. If EVA is a superior measure of economic profit, we

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[2] For the US, UK, Japan, France, Germany, Sweden and Canada, see Mueller (1990); for India, Malaysia, S. Korea, Brazil, Mexico, Jordan and Zimbabwe, see Glen et al. (2001); for India see Kambahampati (1995); for Japan, see Odagiri and Maruyama (2002); for Turkey, see Yurtoglu (2004); for the US see Gschwandtner (2005).

[3] Fisher and McGowan (1983) is the classic criticism of accounting profits; see also the discussion in Mueller (1990).

[4] See Crespo and Gschwandtner (2005, 2008), Bou and Satorra (2007), Cable and Jackson (2008) and Frankel and Lubomir (2009).

[5] In the literature, the few exceptions that we are aware of are Connoly and Schwartz (1985) and Villalonga (2004) who use Tobin's Q, and Schwalbach and Mahmood, (1990) who use Maris' V. However unlike the market measures these authors use, the profit measure we use is primarily an adjusted accounting measure, though as we will explain, it does use market values in determining the cost of capital.

should therefore expect better "fit" compared to previous studies, but a similar overall qualitative assessment of competitiveness.[6] We test the proposition that R^2 will be higher and other hypotheses, elaborated fully below, by comparing our results obtained when using EVA as a profit measure to those we obtained when using the raw Compustat data, from which we obtain measures of unadjusted profit rate.

2 Accounting versus Economic Profit, and EVA

In this section we briefly describe accounting versus economic measures of profits, and EVA. A large topic of debate in industrial organization (see for example the seminal article by Fisher and McGowan, 1983) has been on the use of various measures of profit. Stern, Stewart and Co. produces the data for our analysis, see Stewart et al. (1995). Accounting profit (net income) does not take into consideration the opportunity cost of capital, while economic profit does. EVA is an attempt to measure economic profit:

(1) $\text{EVA}_t = C_t - r\,K_t$

where C_t is cash flow in period t, r is the opportunity cost of capital and K_t is the value of capital the firm utilizes, i.e. the accumulated investment less depreciation. C_t takes into account all revenues and expenses except the opportunity cost of capital, which is what accounting profit measures. However the measurement of EVA from accounting data is not as straight forward as (1) suggests. The following relationship measures EVA:

EVA = Cash flow from operations [a]
+ Accruals (revenues earned but not received or expenses incurred but not paid) [b]
+ After tax interest added back to get operating performance before financing costs [c]
- Capital charge -- current cost of debt and equity [d]
+ Adjustments made by Stern Stewart to correct accounting distortions [e]

Net income before extraordinary items = [a]+[b]
Net operating profits after taxes, NOPAT = [a]+[b+[c]

EVA = [a]+[b+[c] +[d]+[e]

The numerous adjustments made by Stern Stewart (represented by component [e]), are an attempt to correct what accounting fails to do. Figure 1 demonstrates some of these accounting limitations.

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[6] Kapler (2000) found that the adjusted R^2 in a simple fixed-effects model was about 50% higher when she used her profit measure, which made five adjustments to net income. However, the ratio of firm effects to industry effects was virtually identical in both data sets (in each case, industry effects explained about a third as much as firm effects) and so using her improved measure did not change our understanding of the relative importance of firm versus industry effects, even though the model had a better fit when using the economic profit measure.

Figure 1 Accounting limitations and adjustments		
Area	*GAAP**	*Adjustments*
Advertising	Expense: the entire expenditure is deducted during the period it occurs	Record as asset and amortize over several years
R&D	Expense	Record as asset and amortize over several years
Bad debt	Estimated accruals	Reverse the accruals to reflect cash basis reporting
Inventory	Last-in-First-out (LIFO)	Convert to First-in-first-out (FIFO)

*GAAP: generally accepted accounting principles; for more detail see Biddle et al. (1999).

Before reviewing our results in the next section, we note that Mueller (1990) indirectly poses two hypotheses regarding the differences we should expect to find when using a better measure of profits. Mueller (1990, p. 14) writes, "We can expect low R^2 for equations that use accounting profits as the dependent variables..." In short, one would expect a larger R^2 when using a better measure of what is driving the process that researchers aim to model, i.e. the profit drivers. With respect to the speed of convergence (denoted as $1-\hat{\lambda}$ below), a careful reading of Mueller (1990) suggests we should expect our estimate of persistence to be smaller. "…many accounting practices – like profits taxation – tend to "smooth" profits data, thereby importing a degree of convergence toward the norm independent of any competitive pressures." (p. 195).[7]

For completeness, we offer our own hypothesis for how the estimates of steady-state (or long-run) profits (denoted as $\hat{\pi}_{ip}$ below) should differ when comparing estimates from both EVA and unadjusted measures. Accounting profits should be larger than economic profits simply by definition, as the latter include all opportunity costs. Together, these insights provide three tests we can carry out by comparing R^2, the estimates of the speed of convergence and long-run profits.

3 Econometric Methodology and Estimates

In order to facilitate meta-analyses, we use the same empirical methodology as previous studies, following Mueller (1990), which we now describe. The definition of "profit" in economics has been the subject of considerable theorizing (Mueller, 1976). However, the different categories of profit can be described by defining the components of profit rate as $\pi_{it} = c + r_i + s_{it}$ where c is the competitive rate of return, r_i is the rent for firm i (assume it can be bid away over time, but may be firm specific), and s_i is the transitory rent. Assuming s_i is defined by $s_{it} = \lambda_i s_{it-1} + u_{it}$, then by using the definition

[7] Though, as Connoly and Schwartz (1985, p. 388) point out, "Of course, other accounting techniques may have the opposite effect, incorporating into a single period's report costs or revenues more appropriately (for an economist's purposes) spread over several periods." With respect to the sign of the persistence parameter, we take Mueller's hypothesis as our null, and Connoly and Schwartz's as the alternative.

of π_{it} and s_{it}, one can rewrite π_{it} as $\pi_{it} = (c + r_i)(1 - \lambda_i) + \lambda_i \pi_{it-1} + u_{it}$. The first term on the right hand side is a constant; call this α_i. Therefore, the definition of profits given above translates nicely into an autoregressive profits equation,

(2) $$\pi_{it} = \alpha_i + \lambda_i \pi_{it-1} + u_{it}$$

which we have estimated with the Stern Stewart and Co and Compustat data. The empirical methodology is straightforward. For each firm *i* we will regress current year profit rate on last year's profit rate, obtaining three critical values: the estimates of α_i and λ_i, and the adjusted R^2: $\hat{\alpha}_i$, $\hat{\lambda}_i$ and $\overline{R}^2$. Our measure of profit rate will be alternatively either EVA or net income. To each of these, we add interest (from Compustat), and divide by total assets (also from Compustat.) For simplicity we will refer to the two measures as EVA, or ROA (for return on assets).[8] The long-run, or steady-state projected profits of firm *i*, (or formally, the unconditional mean of the autoregressive equation,) is $\hat{\pi}_{ip} = \hat{\alpha}_i / (1 - \hat{\lambda}_i)$. This is the profit rate that the firm will earn in each and every period if nothing in the economic environment changes.

We will compare our results obtained with EVA and ROA. The EVA data is from the Stern and Stewart Performance 1000. The unadjusted accounting data is from Standard and Poor's Compustat database. We are interested to see if the hypotheses we outline above are supported. After eliminating firms for which data from the firms in the Performance 1000 was not available for all years between 1989 and 2003, and those that were not available in our Compustat database, we were left with 331 firms.[9]

In Table 1 and Table 2 we see our estimates of the coefficients in the autoregressive equation, respectively, using ROA and EVA. Let us briefly review our hypotheses: our adjusted R^2 should be higher, the value of $\hat{\pi}_{ip}$ should be lower, and the value of $\hat{\lambda}_i$ should be lower.

Comparing the results in the two tables, we see that the first two hypotheses are supported, while the third is not. Adjusted R^2 is higher, as expected. It turns out to be about four and a half times as high—this is a remarkable improvement in fit. We also find that average long-run profits $\hat{\pi}_{ip}$ are negative in both data sets. That $\hat{\pi}_{ip}$ was lower in the EVA data is consistent with the difference we expected to find. However, tax-smoothing effects do not seem to bias persistence upward. If anything other forces act to bias accounting measures downward.

The number of our 331 firms with t-values whose absolute value of $\hat{\pi}_{ip}$ was above 1.75 (The critical t-value in a two tailed test) is 308, where 160 of these are negative. For Compustat data, 324 firms had absolute value of $\hat{\pi}_{ip}$ greater than 1.75, and 206 of these were negative.

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[8] Following the literature, both measures are normalized to account for business cycle variation, and therefore capture "excess profit."

[9] The majority of firms were removed from the sample because the Performance 1000 did not contain data for all years under study. Then about 100 firms were removed because data from the Compustat database could not be obtained.

Table 1 Results from autoregressive profits equations,
$\pi_{it} = \hat{\alpha}_i + \hat{\lambda}\pi_{it-1} + u_{it}$, $\hat{\pi}_{ip} = \hat{\alpha}_i / (1 - \hat{\lambda}_i)$
using Income + Interest / Total Assets

	mean	mean standard error	minimum	maximum
$\overline{R}^2$	0.0624	--	-0.0833	0.846
$\hat{\pi}_{ip}$	-0.00191	0.060	-0.623	0.325
$\hat{\lambda}_i$	0.2326	0.2718	-2.062	1.943

Table 2 Results from autoregressive profits equations,
$\pi_{it} = \hat{\alpha}_i + \hat{\lambda}\pi_{it-1} + u_{it}$, $\hat{\pi}_{ip} = \hat{\alpha}_i / (1 - \hat{\lambda}_i)$ using EVA / Total Assets

	mean	mean standard error	minimum	maximum
$\overline{R}^2$	0.2784	--	-0.0831	0.895
$\hat{\pi}_{ip}$	-0.00367	.8891	-0.806	0.547
$\hat{\lambda}_i$	0.5255	0.2325	-0.291	1.048

We find that 214 out of 331 firms had significant $\hat{\lambda}$'s in the EVA data, (none of these significant $\hat{\lambda}$ were negative) and this is much more than the 17 that one would expect to find to be significant at that 5% level in a sample of complete noise. In the Compustat data, only 76 firms had positive and significant $\hat{\lambda}$'s, and two firms had negative and significant $\hat{\lambda}$'s. All of this information and more is contained in Table 3 in the Appendix, which places firms into one of six subcategories based on their initial profit.

One notable finding, when analyzing the estimates presented in Table 3, should be emphasized. Even though the estimate of the persistence parameter is larger in Table 2 than in Table 1 (when using EVA rather than ROA), suggesting less competitive dynamics, in some regard, we do find *greater* competitive dynamics in the EVA data. In particular, when using EVA in Table 3, the group with the highest initial profits had only the second highest long-run profits. However, when using ROA, the highest initial group also had the highest long-run profits. Thus, to be precise, one might say the normative picture painted here with respect to persistence of profits is actually mixed.

4 Conclusion

Nonetheless, we find the estimate of average persistence is higher when using the Stern Stewart measure of economic profits rather than unadjusted accounting measures, suggesting accounting profits do not bias persistence upward, although we expected they would. We also find lower long-run profits when EVA is used as the profit measure, and this is as we expected. Taken together, these results suggest a more competitive economy in a neoclassical sense, but a less competitive economy in a classical sense. Overall, it would be hard to conclude that the normative assessment of the US economy is radically different across both sets of estimates—persistence of about .5, which is what we find using EVA, still means that most transitory rents have eroded after about three years. Perhaps our most important finding is that, in the AR(1) model, the adjusted R^2 is much higher when using EVA rather then ROA, as we expected. However, the improvement in fit is unexpectedly dramatic. Taken all together, these findings suggest that accounting measures can be useful in obtaining meaningful estimates, but also that the use of accounting measures could be masking real phenomenon.

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6 Appendix

Table 3. *Comparison of the persistence of profits in the US; two measures of profit rate*

	EVA over Total Assets, 1989-2003 331 firms, normalized			ROA, 1989-2003 331 firms, normalized		
Subsample	$\hat{\pi}_p$	$\hat{\lambda}$	π_0	$\hat{\pi}_p$	$\hat{\lambda}$	π_0
1	.0248	.6296	.0764	.0259	.3332	.0758
2	.0267	.4854	.0233	.0143	.275	.0205
3	.0072	.4709	.0081	-0.0061	.2138	.0035
4	-0.0092	.4859	-0.0014	-0.0127	.1569	-0.0084
5	-0.0244	0.5619	-0.0189	-0.016	.252	-0.0220
6	-0.0464	.5197	-0.0861	-0.0157	.1645	-0.0681
A		256	(77.3)		130	(39.2)
B		148	(44.7)		118	(35.6)
C		160	(48.3)		206	(62.2)
D		214	(64.6)		76	(22.9)
E		0	(0)		2	(0)
F		6			2	
G		0.2542			0.2907	

Notes: Numbers in parentheses are percentages. A= number of cases for which $\overline{R}^2 > 0.1$

B= number of cases for which $\hat{\pi}_{ip}$ is significantly positive (10% level, two-tailed test)

C= number of cases for which $\hat{\pi}_{ip}$ is significantly negative (10% level, two-tailed test)

D= number of cases for which $\hat{\lambda}$ is significantly positive (10% level, two-tailed test)

E= number of cases for which $\hat{\lambda}$ is significantly negative (10% level, two-tailed test)

F= number of cases with $\hat{\lambda}$ >1 (In calculation of average $\hat{\pi}_{ip}$ and $\hat{\lambda}$ in subsamples and of correlation coefficients in row G, the actual value of $\hat{\lambda}$ for each firm was used.)

G= correlation coefficient between $\hat{\pi}_{ip}$ and π_0