

Revenues as a Proxy for Profits:

A Cautionary Note

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Abstract

In the entry literature, researchers sometimes use revenues as a proxy for profits because this is the only data available. Doing so could seriously bias the results.

Key words: Entry, wholesale trade, retail trade, negative binomial regression.

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1 Introduction

Summarizing the results from entry studies, Geroski (1995, p 427) concluded that: "Entry seems to be slow to react to high profits". A possible explanation is that researchers sometimes use revenues as a proxy for profits because this is the only data available (e.g., Bae, 1997; Scott-Morton, 1999; Rudholm, 2001; Daunfeldt et al., 2005). However, when this is done the cost structure of the individual firm is simply ignored, possibly creating biased results.

This note examines whether revenues can reliably be used as a proxy for profits, using empirical data on entry into the Swedish local retail and wholesale markets during the period 1989-1996. Data from the annual reports of all retail and wholesale firms tax-based in 233 municipalities of operation was analyzed using a negative binomial regression model.¹

The qualitative results regarding the impact of profits on entry are often different when revenues are used as the profit measure instead of return on equity. Hence, using revenues as a proxy for profits severely biased the results. Therefore, we advise caution in using revenues instead of actual profits in entry studies.

The next section describes the data, the empirical method, and the results. Section 3 discusses the lessons that might be learned from the analysis.

¹Entry by larger establishments not tax-based in the municipality of entry could not be analyzed using the available data. However, according to data collected by the Swedish Research Institute of Trade (HUI) for 1996, 88% of retail firms were tax-based in the municipality of operation that year. The numbers of course differ depending on type of business; branches of chains are most common in retail trade of shoes (but still 71% of establishments are tax-based in the municipality of operation), and least common for florists (99% individual firms). Unfortunately, we have not been able to find any similar data for Swedish wholesale trade.

2 Empirical Analysis

2.1 Data

All Swedish firms are required to submit their annual reports to the Swedish patent and registration office (PRV). The data, collected from PRV by Upplysningscentralen AB (UC), includes measures of revenue, profit, salaries, fixed costs, and liquidity.²

To control for municipality-specific effects on entry, we also use data provided by Statistics Sweden including demographics, average income, political preference, educational level, and unemployment in each municipality. Due to the division of some municipalities into smaller units, as well as the mergers of three counties in Sweden during the studied period, a total of 56 municipalities were omitted from this study, leaving a total of 233.

The sample is restricted to firms with documented positive sales during the study period. The dependent variable is the number of entrants in 7 retail and 7 wholesale markets (defined by 3-digit SNI-codes) in municipality m ($= 1, \dots, 233$) in period t ($= 1990, \dots, 1996$).³

2.2 Regression model

Since the number of entrants in each municipality and industry is observed over time (i.e., longitudinal/panel data), it is possible to control for municipality-, industry-, and time-specific heterogeneity in our model. As the number of firms entering a market is a positive integer, a negative binomial regression

²UC is a credit bureau that collects information on both firms and individuals residing in Sweden.

³SNI refers to the Swedish standard industrial classification.

model is used, with the conditional mean specified as

$$E(N_{jmt}|X_{jmt}) = \mu_{jmt} = e^{(\alpha_i + \gamma\pi_{jmt-1}^0 + \beta' \mathbf{X})} \quad (1)$$

Profit opportunities for the entrant are captured by π_{jmt-1}^0 . Two profit measures, gross returns and net returns were compared with revenues (see Table 1 below). All three measures were divided by owner's-equity.

Table 1 reports means, standard deviations, definitions, and sources of the dependent variable and the three profit measures.

Table 1 about here

To control for other factors that could influence entry, the vector \mathbf{X} includes the 10-year government bond interest rate; a dummy for the 1995 decision to increase the minimum capital necessary for starting a corporation; sunk costs; market concentration; the size of the market; the average size of the incumbent firms; recent entry; population of the municipality; population density; average per capita income; and the local unemployment rate. We also control for the presence of a university, the educational level of the population, political preferences, and political stability.⁴

2.3 Results

Determinants of entry into Swedish retail and wholesale markets are studied at both aggregated and disaggregated levels. In the aggregated version,

⁴Daunfeldt et al. (2006) provides theoretical framework for the determinants of entry into Swedish retail and wholesale trade, as well as a thorough discussion of all variables included in the empirical analysis.

Equation (1) is estimated for all retail or wholesale industries. In the disaggregated version, Equation (1) was estimated for each 3-digit SNI-codes in both retail and wholesale trade (14 categories altogether). As the purpose here is only to analyze whether revenues are a reliable proxy for profits, only qualitative results are presented in Table 2 below.⁵

Table 2 about here.

Using gross profits or net profits does not appear to make much difference, though net profits performed better in terms of statistical significance. However, using revenues as a proxy for profits yielded qualitatively different results in both aggregated retail and wholesale markets, as well as in six of the fourteen analyses at 3-digit SNI level.⁶

3 Summary and Conclusions

Using revenues as a proxy for profits in entry studies can severely bias the results. When studying entry into Swedish retail and wholesale markets in

⁵The full results can be found at www.hui.se, choosing research and then HUI Working Papers. The paper is listed as HUI Working Paper No 4.

⁶SNI-code 521 represents general retail food stores, 522 represents specialized food stores, 523 represents retailing in pharmaceuticals, cosmetics and hygiene articles, 524 represents specialized retailing of other goods, for example textiles and furniture, 525 represents firms specialized in antiques, 526 represents mail order firms, and 527 represents maintenance and repair of good sold under the above categories.

Turning to the wholesale categories, SNI-code 511 represents agency trade, 512 represents wholesale of, amongst others, livestock, crops, tobacco, flowers and plants, 513 represents wholesale trade of food and alcohol, 514 represents clothes, shoes, textiles and furniture, 515 concern wholesale of fuels, metal and wood, 516 represents heavy tools and building equipment, and 517 is a generic group consisting of all other types of wholesale firms.

the early 1990s, the researcher could draw the wrong qualitative conclusions half of the time.

Of course the cost structure of the individual firm is simply ignored when revenues are used as a proxy for profits. This should only be done when no profit measure is available, and even then the results should be interpreted with caution.

Finally, net profits (which are closer to "the bottom line", i.e., what the entrepreneur actually cares about) performed somewhat better than gross profits in terms of statistical significance.

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Table 1: Means (SD in parentheses), definitions, and data-sources of variables.

Variable	Retail	Wholesale	Definition and source
<i>Entry</i>	0.32 (1.14)	0.46 (2.03)	Number of entrants in a specific retail or wholesale industry in a specific municipality ($m=1,\dots,233$) during the year t ($t=1990,\dots,1996$). Source: UC.
<i>Revenue</i>	2.2698 (0.848)	2.1099 (0.947)	Revenue in the industry in municipality m during time $t-1$ /Owners equity during time $t-1$. Source: UC.
<i>Gross profits</i>	0.0864 (0.124)	0.0994 (0.141)	Retail sales revenues minus costs excluding financial costs, extraordinary costs, capital depreciation etc in the industry in municipality m during time $t-1$ /Owners equity during time $t-1$. Source: UC.
<i>Net profits</i>	0.0319 (0.098)	0.0394 (0.112)	Retail sales revenues minus costs including financial costs, extraordinary costs, capital depreciation etc in the industry in municipality m during time $t-1$ /Owners equity during time $t-1$. Source: UC.
No. of obs.	44 826	37 923	

Table 2. Impact of various profit measures on entry

SNI-Code	Gross profits	Net profits	Revenues	Difference ^a
Aggregated wholesale	-	-	+***	Yes
511 - agency trade	+	+	-	No
512 - livestock, crops etc	-	-	+	No
513 - food and alcohol	-**	-**	+*	Yes
514 - clothes, textiles, furnitures etc	+	+	+	No
515 - fuels, metals, wood	-	+	+***	Yes
516 - heavy tools and building equipment	-	-	+*	Yes
517 - all other	-	-	-	No
Aggregated retail	+	+**	-	Yes
521 - general grocery stores	+	+	+	No
522 - specialized food stores	+	+*	-	Yes
523 - pharmaceuticals, cosmetics etc	-	-	-	No
524 - textile, furnitures etc	+	+	-***	Yes
525 - antiques	-	+	-***	Yes
526 - mail order	-	-	-	No
527 - maintenance and repairs of goods	+	+	+	No

^a Between revenues and our second profit measure.

* denotes significance at the 10%-level

** denotes significance at the 5%-level

*** denotes significance at the 1%-level