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Capital structure and firm performance:

Evidence from the airport industry

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The privatisation and liberalisation waves have been increasing the number of private companies in the aviation industry. This, in turn, necessitates new policy analyses on major financial decisions regarding capital structure, corporate governance and investments. Among these major topics, the research about the association between capital structure and financial performance of the aviation companies largely focuses on the airlines. But a comparable analysis for the airport companies is less explored. The goal of this study is to contribute to the literature by analysing how the capital structure of the publicly traded airport companies affects their profitability and market valuation. Using an unbalanced panel data sample of 29 publicly traded airports from 20 countries over the 1989-2017 period, our findings suggest that higher total and long-term leverage tend to decrease return on assets whereas they are positively associated with return on equity.

Keywords: *Airport industry, capital structure, financial leverage, firm performance, market valuation.*

1. Introduction

State ownership was the norm in the airport industry for decades and the industry was hardly under the pressure of market forces. Accordingly, the profitability was not at the top of the priority list and state treasuries were subsidizing the airports when necessary.

The privatization and commercialization waves reversed the financial philosophy in the airport industry. More and more state-owned airports are now operating with a commercial approach. They tend to achieve profitability by more appealing to non-aeronautical revenue sources. In addition, governments are now subjected to international anti-competition rules and they have to comply with certain regulations regarding state aids to airports[2]. The financial management of privatized airports has changed even more drastically. They have private investors who expect to earn a decent profit. Some of the privatized airports are corporatized as a part of concession agreements and they have to pay large amounts of project debts. In addition, no matter whether the airport company is a state-owned or a private one, corporatized airports are now in search of an optimum capital structure that will ensure lower cost of capital and in turn higher profitability. To enable this, airport companies

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[2] See Macário (2008) for the detailed evolution of the airport industry.

appeal to debt markets and issue their shares in the stock exchanges. Such factors make capital structure decisions more critical than ever before for airport companies.

Several theories try to address the respective challenges the firms have been facing. The variety of these theories and the previous studies which provide empirical evidence for each of these capital structure theories mean that it is quite difficult to offer one single magical capital structure mix for every industry. When we focus on the transport industry, we see that the extent of capital structure research is very limited and no study except Malighetti et al. (2011) has focused on the capital structure problems of the airport companies. Regarding maritime transport, Drobetz et al. (2013) examined the determinants of the capital structure of the shipping companies. Concerning aviation industry, Fernandes and Capobianco (2001), Capobianco and Fernandes (2004), and Capobianco and Fernandes (2004) analysed the financial efficiency of the airlines through data envelopment analysis where they adopted capital structure parameters as inputs. On the other hand, Malighetti et al. (2011) followed a more extensive methodology where they tested the determinants of the market valuation of airline and airport companies by using operational, locational, and financial variables including the financial leverage. But the effect of the capital structure of airport companies on their profitability remained totally untouched in the literature.

This paper tries to fill in this gap by examining the profitability and valuation effects of capital structure decisions in the airport industry[3]. More concretely, we test how the changes in financial leverage contribute to the profitability and market valuation of the publicly traded airports using a multinational sample of 29 airports from 20 countries. Our findings suggest that higher financial leverage tends to decrease return on assets (ROA) whereas it leads to an increase in return on equity (ROE). We believe that our analyses can contribute to the managers of the airport companies in designing the optimal capital structure and making decisions regarding both borrowing and equity financing.

This paper is organized as follows. In Section 2, we will summarize the existing literature on the association between financial leverage, firm profitability, and market valuation. In Section 3, we will explain the data and methodology. Section 4 will discuss the empirical findings; and in Section 5, we will present the conclusions.

2. Literature review

In their seminal work, Modigliani and Miller (1958) claimed (with several restrictive assumptions such as no taxes, no transaction costs, no bankruptcy costs, and the symmetry of market information) that the capital structure did not affect firm value. Their theory suggests that the assets of the firm decide its value rather than the blend of debt and equity. Their theory of "capital structure irrelevance" was later followed by three capital structure theories that are trying to bring new explanations when these restrictive assumptions are not valid.

Against the no taxes assumption of the theory of capital structure irrelevance, the trade-off theory claims that firms aim at equating the tax advantages of the extra debt with the cost of this extra debt arising as a result of its additional financial risk. Pecking order theory suggests that the firms' first choice will be borrowing rather than equity issuing when new financing is necessary. Free cash flow

[3] Our study differs from Malighetti et al. (2011) in a couple ways. First, it uses a different formula to compute Tobin`s Q. Second, the composition of our explanatory variables are quite different. Last, we add profitability indicators to measure the airport performance.

theory asserts that the high level of debts will be desirable when firms have high cash flows surpassing the feasible investment options.

Though the capital structure has been one of the hottest topics in the finance literature, it is relatively less studied in the transport industry. The available studies regarding the transport industry concentrated on the airlines where there exists a relatively high number of publicly traded companies. Fernandes and Capobianco (2001) employed a data envelopment analysis (DEA) to explore the association between the financial inputs and outputs of 35 airlines over the 1993-1996 period. Their input was the financial leverage and the output variables were net margin, total assets turnover, operating margin, net assets turnover, and two profitability ratios (return on equity and return on net assets). They documented that the shareholders' capital ranged from 40 to 75% at efficient airlines. The findings of Capobianco and Fernandes (2004), which confirmed those of Fernandes and Capobianco (2001), pointed out that efficient airlines maintained at least 40% shareholder capital within their capital structure. Using a dataset consisting of 42 airlines over the 2001-2002 period, Pires and Fernandes (2012) examined the financial efficiency of airlines. They found airlines reducing debt tended to increase their profitability. Malighetti et al. (2011) followed a more comprehensive approach. They tested the factors affecting the valuations of aviation firms. Their results showed that stock markets appreciated airports with larger assets, ROA, leverage, and passenger growth when valuing them. With respect to the airlines, utilizing larger aircraft and adopting a low-cost business model contributed to the airline valuation whereas airline age and the number of routes served had a negative association with the airline value.

The findings of the studies, which target how capital structure affects a firm's performance, do not suggest uniform outcomes. The first group of studies reported a negative association between financial leverage and firm performance. Majumdar and Chhibber (1999) examined the linkage between leverage, which was measured by debt to equity ratio, and financial performance using a dataset consisting of more than 1000 Indian firms over the 1988-1994 period. They showed that financial leverage had a negative association with profitability that was measured by return on net worth. Khan (2012) analysed the financial performance impacts of capital structure in Pakistan using a sample of 36 listed engineering firms throughout the 2003-2009 period. He adopted ROA, ROE, Tobin's Q, and gross profit margin as the financial performance measures. His results revealed that higher levels of short and total debts (both normalized by total assets) reduced ROA, gross profit margin, and Tobin's Q. Using a sample of 80 firms listed on the Tehran Stock Exchange over the 2006-2010 period, Pouraghajan et al. (2012) evaluated the profitability changes of the firms with respect to their capital structures. Their findings implied that total debt to total asset ratio had a negative association with both ROA and ROE. Le and Phan (2017) handled a dataset consisting of Vietnamese non-financial listed firms over the 2007-2012 period. They employed short-term, long-term, and total debt proportioned to both book and market value of total assets as the leverage indicators. Their analyses revealed that all of these six leverage parameters had negative effects on all of the three financial performance variables (ROA, ROE, and Tobin's Q).

The second group of research revealed the positive impact of financial leverage on firm profitability and valuation. Margaritis and Psillaki (2007) studied a sample of 12,240 New Zealand firms to examine the impact of capital structure on firm efficiency through DEA. They first calculated the efficiency of the firms using labour and capital as the inputs and value-added as the output. Then they run ordinary least squares (OLS) models where these calculated efficiency scores were used as the dependent variables. Their findings showed that higher leverage led to higher efficiency levels. Margaritis and Psillaki (2010) used a sample of manufacturing firms from France for the years 2002 and 2005 to test the association among ownership, capital structure, and firm performance. Their OLS and random-effects panel estimation documented that leverage had a positive effect on firm efficiency. After studying a sample of 141 textile firms from Pakistan between 2004 and 2009, Memon et al. (2012) reported that higher debt to equity ratio tended to increase ROA. Fosu (2013) analysed the association between capital structure, market competition, and firm performance by adopting a dataset including 257 South African firms throughout the 1998-2009 period. Their results suggested that higher degrees of leverage, which was measured by total debt to total assets and the relative leverage calculated using the industry averages, enhanced ROA.

The findings of the last group of studies suggested mixed associations between leverage and firm performance. Abor (2005) assessed the influence of capital structure on the financial performance of 22 Ghanaian listed firms between 1998 and 2002. His OLS estimations underlined the positive impact of short-term debt to total capital ratio and the negative effect of long-term debt to the total capital ratio on the EBIT/equity ratio. In a follow-up study, Abor (2007) evaluated and compared the linkage between capital structure and firm performance both in Ghana and South Africa. His dataset included 160 Ghanaian and 200 South African small and medium enterprises over the 1998-2003 period. He reported that the ratio of short-term debt to total capital decreased gross profit whereas long-term debt to total capital increased this margin in both countries. Kyereboah-Coleman (2007) tested whether the capital structure affected the performance of the 52 microfinance institutions from Ghana over the 1995-2004 period. They adopted two microfinance specific performance measures such as outreach and default. His analyses indicated both short-term debt and total debt (both normalized by total capital) had a negative association with outreach whereas total debt to total capital ratio tended to increase the default rate of the microfinance institutions. El-Sayed Ebaid (2009) examined how the capital structure decisions affected firm profitability in the Egyptian context. His dataset covered all publicly traded firms on Egyptian stock exchange throughout the 1997-2005 period. He adopted ROA, ROE, and ratio of gross profit to sales as the financial performance measures. His OLS estimations suggested that the ratio of short-term debt to total assets had a negative impact on ROA (at 0.01 significance level) but a positive effect on ROE (at 0.05 significance level). Hasan et al. (2014) studied a Bangladeshi dataset, involving 36 listed firms and covering the 2007-2012 period, to test the effect of capital structure on financial profitability. After adopting a pooling panel data estimation, they documented that a higher ratio of short-term debt to total assets increased earnings per share whereas the higher ratio of long-term debt to total assets tended to decrease it. After testing a sample of 1,594 Indian firms over the 1998-2011 period, Bandyopadhyay and Barua (2016) showed that total borrowings to total assets had a positive association with the ratio of operating profit to total assets whereas long-term borrowings to total assets and bank borrowings to total assets increased it. Using a sample of 167 Jordanian firms over the 1989-2003 period, Zeitun and Tian (2014) tested the association between capital structure and firm performance. They employed ROA, Tobin's Q, the ratio of the market value of equity to its book value, and the ratio of earnings before interests, taxes, depreciation, and amortization (EBITDA) to total assets (PROF) as the measures of profitability. Their findings suggested that total debt to total assets ratio had a negative effect on ROA and Tobin's Q whereas long-term debt to total assets ratio had a similar impact on ROA and PROF. The impact of the ratio of short-term debt to total assets was more contradicting. According to the panel data models, the increase in short-term financing reduced ROA and PROF but raised Tobin's Q.

3. Data and methodology

3.1. Data

We use the Bloomberg database to gather the financial data of the 29 publicly traded airports from 20 countries (Table A1 in the Appendix). Our sample is an unbalanced panel and covers the 1989-2017 period. Table 1 presents the definitions, descriptive statistics, and data sources of all variables used in our analyses and Table 2 shows the correlation matrix of these variables. Table 2 reveals that the correlation coefficients among independent variables are low implying that the problem of multicollinearity may not be an issue.

Table 1. Descriptive statistics

Variable	Definition	Expected Sign	Mean	Std. Dev.	Minimum	Maximum
ROA	The ratio of pretax income to total assets		0.078	0.043	-0.0267	0.198
ROE	The ratio of pretax income to book value of equity		0.137	0.085	-0.116	0.564
Tobin's Q	The ratio of the market value of equity to the book value of equity		9.121283	80.09516	0.351	1065.694
Total leverage	The ratio of total liabilities to total assets	+, -	0.400	0.210	0.023	0.912
Short-term leverage	The ratio of short-term liabilities to total assets	+, -	0.138	0.090	0.007	0.553
Long-term leverage	The ratio of long-term liabilities to total assets	+, -	0.262	0.194	0	0.855
Size (million USD)	The net sales of each airport company	+	423.150	526.600	0	2650.549
Tangibility	The ratio of fixed assets to total assets	+, -	0.812	0.109	0.436	0.991
Growth	The ratio of total capital to its last year figure where the total capital is equal to the sum of long-term debt and equity	+	1.186	1.807	0	37.884
Holding	A dummy variable equal to one for airport companies operating more than one airport.	+	0.387	0.488	0	1

Table 2. Correlation Matrix

	ROA	ROE	Tobin's Q	Total leverage	Current leverage	Long-term leverage	Size	Tangibility	Growth	Holding
ROA	1.0000									
ROE	0.7286	1.0000								
Tobin's Q	0.0223	-0.0032	1.0000							
Total leverage	-0.3665	0.2517	-0.0264	1.0000						
Current leverage	-0.0956	0.0757	0.0277	0.3865	1.0000					
Long-term leverage	-0.3526	0.2375	-0.0415	0.9039	-0.0451	1.0000				
Size	-0.1614	0.0259	-0.0375	0.3357	-0.0277	0.3764	1.0000			
Tangibility	-0.2841	-0.0443	-0.0704	0.2940	-0.1192	0.3738	0.1360	1.0000		
Growth	-0.0315	-0.0011	-0.0029	0.0657	-0.0230	0.0819	-0.0166	0.0308	1.0000	
Holding	0.0218	0.1632	-0.0752	0.1296	-0.2013	0.2338	0.4672	0.0443	-0.0377	1.0000

3.2. Methodology and research hypotheses

This study attempts to examine how the financial leverage of the publicly traded airports affect their financial performance and market valuation. This linkage is critical in shaping directly the capital structure decisions and indirectly the ownership structure of the airports. Regarding this linkage, agency theory suggests that higher leverage can be used to discipline the managers (see (Jensen and Meckling, 1976) for further discussion). On the other hand, the trade-off theory suggests that the firms should borrow up to a point where the tax advantage of debt becomes equal to the additional cost of extra debt as a result of higher financial risks. Differently, the pecking order theory predicts that the firms will borrow first rather than issuing equity (Myers and Majluf, 1984). The specification used to test the association mentioned is as follows:

Y = f (FINANCIAL LEVERAGE, SIZE, TANGIBILITY, GROWTH, HOLDING, LAGGED Y) (1)

In (1), Y stands for the performance of the airport companies. There is a large variety of methods for measuring the performance of the airports. Francis et al. (2002) surveyed the 200 largest passenger airports to examine which performance management techniques they were using. Their study pointed out that best practice benchmarking, total quality management, and the activity-based costing were the top three most frequently used performance management and measurement methods. In addition to such approaches employed by the practitioners, a large body of academic research adopted various techniques to benchmark airport performance. The majority of these studies employed either data envelopment analysis [(Parker, 1999), (Martín and Román, 2001), (Pachecoa et al., 2006), and (Lin and Hong, 2006)] or factor productivity methods [(Oum et al., 2003), (Oum and Yu, 2004), and (Oum et al., 2006)]. Such studies tended to use mostly non-financial input and output parameters such as the number of aprons and runways, terminal area, number of personnel, and passenger and air cargo volume. The relevant studies on the financial performance of airports rather adopted either traffic based parameters such as revenue per workload unit-WLU (calculated using passenger and air cargo traffic) and cost per WLU [(Humphreys and Francis, 2002), (Vogel, 2006) and (Graham and Dennis, 2007)] or employed financial variables such as profit, revenue, ROA ROE, return on sales, Tobin's Q, and EBITDA margin [(Vogel, 2006), (Vogel, 2011), (Malighetti et al., 2011), (Kato et al., 2011), and (Usami and Akai, 2012)], which were calculated using financial statements and stock prices of the airport companies.

In this study, we adopt three separate variables for Y. Two of them, return on assets (ROA) and return on equity (ROE), target the financial performance and they are widely used variables in the comparable studies. To handle the possible problems associated with the differences in tax systems in different countries and to be able to make a fair comparison, we use the pre-tax income in calculating both ROA and ROE. ROA is equal to the ratio of pre-tax income to total assets whereas ROE is the ratio of pre-tax income to equity.

The last variable we employ for Y, Tobin's Q, aims at capturing the valuation impacts of financial leverage in the stock markets. There are numerous formulas for Tobin's Q in the literature. The Tobin's Q we employ in this study is equal to the sum of the market capitalization of equity and total debt divided by total assets.

Regarding leverage, we used three separate leverage variables. Total leverage, short-term leverage, and long-term leverage stand for the ratio of total debt, current debt, and long-term debt to the total assets, respectively. As outlined in the literature review section, previous studies documented contradicting impacts of financial leverage on the firm financial performance and valuation. Accordingly, we expect that the coefficient of all three financial leverage variables can get either positive or negative coefficients.

In addition to leverage variables, which are the focus of our study, we also included a couple of control variables, which might affect profitability and market valuation. Our first control variable in (1) is the size. In many industries, firms try to achieve economies of scale to reduce their unit costs and we can expect that larger firms tend to be more profitable. In addition, the airport industry is a capital-intensive one. It requires a significant amount of initial investment for the runways, passenger terminals, and necessary air navigation systems. Provided that there is ample capacity, airport managers can substantially increase airport revenues by marginally increasing their costs. So we expect that size will be a significant factor in airport profitability. Previous literature also took the possible impact of the size of the firms into account when examining the linkage between the capital structure and financial performance. In comparable studies, either total assets [(Kyereboah-Coleman, 2007), (El-Sayed Ebaid, 2009), (Khan, 2012), (Zeitun and Tian, 2014), (Hasan et al., 2014), (Fosu, 2013), and (Bandyopadhyay and Barua, 2016)] or total sales [(Majumdar and Chhibber, 1999), (Abor, 2005), (Margaritis and Psillaki, 2007), (Margaritis and Psillaki, 2010), and (Memon et al., 2012)] are frequently used to capture the impact of the size of the firms on their financial performance. In this study, we use the natural logarithm of the net sales of airport companies to measure their size. We anticipate that the coefficient of the size variable will be positive.

The second control variable in (1) is the tangibility. The tangibility of a firm can affect its profitability in either way. From the agency theory point of view, firms with higher tangibility ratios tend to reduce their agency costs and borrowing is easier for them than those with lower tangibility. In addition, Campello (2006) underlined that higher tangibility provides a performance incentive because more tangible assets empower outside investors' hand to appeal for bankruptcy or replace the management. On the other hand, higher ratios of tangible assets can reduce the flexibility of the firm in the time of the economic crises. In the comparable studies examining the linkage between financial leverage and firm performance, Margaritis and Psillaki (2007) and Margaritis and Psillaki (2010) documented the positive association between tangibility and firm efficiency whereas Memon et al. (2012) showed higher tangibility reduced ROA in the Pakistan textile industry. Zeitun and Tian (2014) revealed that tangibility decreased ROA and the ratio of the market value of equity to its book value but it increases the ratio of earnings before interest, taxes, and depreciation to the total assets. In this study, tangibility refers to the ratio of fixed assets to total assets and it can get either a positive or a negative coefficient.

The third control variable we included in (1) is the growth. Zeitun and Tian (2014) and Memon et al. (2012) showed firm growth contributed to ROA whereas Abor (2005) documented a similar impact on ROE. Similarly, Margaritis and Psillaki (2010) reported how firm growth stimulated firm efficiency. Likewise, the findings of Le and Phan (2017) suggested that firm growth added to ROA, ROE, and Tobin's Q. Previous studies employed two major measures for the firm's growth. Abor (2005), Margaritis and Psillaki (2010), Fosu (2013), Zeitun and Tian (2014), and Le and Phan (2017) used sales growth whereas Memon et al. (2012) used asset growth. Following the majority of the literature, we define firm growth as the ratio of current sales to the last year's sales figure. We expect that the growth variable will get a positive coefficient.

Our sample has a very large variety in terms of geographic focus, ownership structure, business model, size, and market power. Some airport companies own all or most of their airports (like AENA) whereas some others are a part of BOT contracts and they only operate them over a pre-specified duration (like TAV Airports Holding). Some airport companies own/operate a single airport (like Auckland International Airport) whereas others own/operate a group of airports (like Malaysia Airports Holdings). Some airport companies operate only the passenger terminals (like Japan Airport Terminal Co. in Haneda Airport) whereas others assume the management of the entire airports (like TAV Airports Holding operating the Medinah Airport). There are cases where airports have the monopoly power (like Malta International Airport and Belgrade Nikola Tesla Airport) whereas several airport companies have to compete in their catchment areas (Ataturk Airport of Istanbul operated by TAV Airports Holding had to compete with Sabiha Gökçen Airport of Istanbul). Unfortunately, to incorporate all these features of the airport companies into the same specification is quite challenging, especially given the relatively limited size of our sample. Nevertheless, we can still measure the market concentration of airport companies. Our dummy variable, Holding, is equal to one for airport companies operating more than one airport. We expect that holding companies managing more than one airport can be more profitable considering the economies of scale and possible network effects among airports within the same holding structure.

The last control variable we included in our analysis is the lagged values of the dependent variables. This is a common approach in comparable studies. When examining the impact of capital structure on firm financial performance, Fosu (2013), Bandyopadhyay and Barua (2016), and Le and Phan (2017) employed the lagged values of the dependent variables. We expect that these one-year lagged variables of the dependent variables will get a positive coefficient.

4. Empirical results

Table A2 in the Appendix presents the results of the panel data estimations. Table A2 consists of three panels. Panel A, B, and C depicts the fixed effects (FE), random effects (RE), and OLS regressions where we use ROA, ROE, and Tobin's Q as the dependent variable, respectively After running these estimations, we first performed a Hausman test to choose between FE and RE models.

In panels A and B, where we regress ROA and ROE on the independent variables, respectively, we had large Hausman statistics implying that FE would be more preferable to RE models. On the other hand, the Hausman statistics in panel C suggested that we should pick RE to model Tobin`s Q. Following the Hausman test, we did two post-estimation tests, one for heteroscedasticity and one for autocorrelation, to check the validity of our estimations. The Wald Test for Heteroscedasticity suggested that all our estimations suffered from heteroscedasticity and the Wooldridge test revealed that autocorrelation existed.

Table 3. GMM Estimation Results

	ROA	ROA	ROA	ROE	ROE	ROE	Tobin's Q	Tobin's Q	Tobin's Q
Total leverage	-0.04** (2.40)			0.07** (2.05)			7.29 (0.92)		
Short-term leverage		-0.02 (0.67)			0.02 (0.20)			3.29 (0.71)	
Long-term leverage			-0.03** (2.14)			0.07** (2.10)			7.58 (0.94)
Size	0.01** (2.12)	0.00* (1.70)	0.01* (1.94)	0.01** (2.43)	0.02*** (3.65)	0.01** (2.32)	-3.16 (1.02)	-2.82 (1.02)	-3.36 (1.01)
Tangibility	-0.07*** (2.59)	-0.09*** (3.20)	-0.07*** (2.84)	-0.13*** (2.80)	-0.09** (2.03)	-0.11*** (2.89)	12.47 (0.94)	16.07 (0.93)	11.84 (0.91)
Growth	-0.00 (1.15)	-0.00 (1.33)	-0.00 (0.99)	0.00 (0.83)	0.00 (1.00)	0.00 (0.80)	-0.02 (0.75)	-0.10 (0.82)	-0.01 (0.42)
Holding	-0.00 (0.07)	0.00 (0.15)	-0.00 (0.38)	-0.00 (0.05)	0.00 (0.01)	-0.00 (0.20)	9.05 (1.09)	10.35 (1.08)	8.93 (1.07)
Lagged ROA	0.57*** (12.75)	0.60*** (13.74)	0.58*** (12.15)						
Lagged ROE				0.61*** (8.76)	0.64*** (9.68)	0.63*** (9.95)			
Lagged Tobin's Q							0.80*** (213.60)	0.80*** (206.56)	0.80*** (200.73)
Constant	0.08*** (3.33)	0.08*** (3.38)	0.07*** (3.07)	0.06 (1.38)	0.02 (0.52)	0.06 (1.39)	0.04 (0.01)	-2.61 (0.48)	2.56 (0.72)
Wald Test	418.03	340.88	627.79	140.86	172.60	174.07	2.12e+06	2.42e+06	2.37e+06
Prob > Chi^2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
AR1	0.0003	0.0003	0.0002	0.0053	0.0047	0.0057	0.3130	0.3135	0.3128
AR2	0.2567	0.2202	0.3323	0.1276	0.1164	0.1175	0.3259	0.3253	0.3251
Number of groups	29	29	29	29	29	29	28	28	28
Number of observations	415	415	415	415	415	415	390	390	390

Notes: (1) Sale figures (to measure size) in natural logs. (2) z-statistics in parenthesis based on robust regressions. (3) ***, **, and * stand for significance levels at 1%, 5%, and 10%, respectively.

In the presence of both heteroscedasticity and autocorrelation, we can use alternatives such as the generalized method of moments (GMM) and generalized least squares (GLS) estimators to handle such problems. Among these two estimations, we decide to employ GMM since GMM is superior to GLS estimation in that it allows us to check for possible endogeneity, which might be an issue in our case between financial performance and both leverage and size. Please note that, though GMM estimation is capable of handling the endogeneity, we make a double check by plotting the graph of the size versus the residuals. The evenly scattered residuals depicted in Figure A1 at the Appendix reveal that size is exogenous to our model. We should also note that comparable studies examining the effect of capital structure on financial performance like Fosu (2013), Bandyopadhyay and Barua (2016) and Le and Phan (2017) also employ GMM estimator to address such problems. Table 3 reports the results of our GMM estimations.

We begin with the linkage between financial leverage and ROA. The first three columns of Table 3 show that both total and long-term leverage had a statistically significant and negative impact on ROA. More concretely, holding other variables constant, a 1-unit increase in total and long-term leverage should be expected to decrease ROA by 0.04 and 0.03 unit, respectively. When we consider ROE, however, our analyses found a reversed association between profitability and financial leverage. Our findings revealed that, holding other variables constant, a 1-unit increase in both total and long-term leverage should lead to a 0.07-unit increase in ROE. Regarding valuation, our estimations did not document a statistically significant association between the financial leverage and market valuation of the airport companies, which was measured by Tobin's Q.

With respect to the control variables, SIZE, TANGIBILITY, and lagged of the dependent variables have statistically significant coefficients. As anticipated, airports with higher sales tended to be more profitable. In all of the 6 estimations for profitability, SIZE got positive and statistically significant coefficients. According to our estimations, TANGIBILITY had a negative impact on profitability. In all of the first 6 estimations for profitability (ROA and ROE), the coefficient of TANGIBILITY was negative and statistically significant at the 1% significance level (except for the fifth estimation where the significance is at the 5% level). Despite we expect to document positive and statistically significant coefficients for GROWTH and HOLDING, our findings did not reveal such a relation. Last, our results presented a very strong linkage between ROA, ROE, and Tobin`s Q and their one year lagged figures. In other words, the one year lagged figures of ROA, ROE, and Tobin`s Q are very strong determinants of their current values and coefficients of these lagged variables are statistically significant at the 1% significance level.

Our analyses document a relatively uncommon finding regarding the associations among financial leverage, ROA, and ROE. As outlined in the literature review, the financial leverage tends to affect both ROA and ROE in the same direction; it either reduces or increases both. In our case, however, increasing leverage tends to reduce ROA but increase ROE. In the relevant literature, there is only one similar result. El-Sayed Ebaid (2009) documented that increasing ratio of short-term debt to total assets was associated with higher ROE but it led to a decrease in ROA.

At first glance, these findings might not only seem inconsistent but also they may suggest attaining higher financial leverage levels from the shareholders' point of view. However, both conclusions may be misleading. First, the movement of ROA and ROE in opposite directions with increasing financial leverage is unusual according to the majority of the relevant literature[4], but in fact, it is quite possible. For example, assume an airport company is financing its new runway investment with 100% debt. This investment will very likely increase its revenues but the percentage increase in its profit may remain lower than a percentage increase in its total assets. In such a case, its ROA will eventually decrease but its ROE will increase since the nominator (return) of the fraction for ROE will increase while the denominator (equity) will stay unchanged. This short example explains how ROA and ROE can move in opposite directions.

Another possible misconception can arise if airport management opts to increase airports' leverage to attain higher ROE despite declining ROA. Finance theory claims that the maximization of shareholders' wealth is the major the goal of the firms and higher ROE seems to serve this goal better than ROA does. However, an increasing ROE (despite decreasing ROA) might misdirect the shareholders about the overall financial health of the firm. Declining ROA can stimulate the financial risk of the firm and in turn compromise the continuation of profitable operations. Particularly, ROE may increase but the increasing returns may fail to cover the increasing debt. Therefore, ROA may be a better signal for the financial performance of the airports than ROE. Accordingly, we can conclude that lower financial leverage, which is more likely to increase ROA based on our findings, may be more desirable for the airport companies from the financial management point of view despite declining ROE.

5. Conclusion

Using an unbalanced panel data sample of 29 publicly traded airports from 20 countries over the 1989-2017 period, this paper examines how the capital structure of the publicly traded airport companies affects their profitability and market valuation. Our results suggest that higher total and long-term leverage tend to reduce ROA whereas they are associated with higher ROE ratios. Regarding market valuation, our findings failed to show a statistically significant effect of the 3 leverage variables on Tobin`s Q. Our findings also reveal that larger airports are likely to be more profitable whereas airports with lower tangibility ratios are inclined to show superior performance in terms of ROA and ROE. The findings presented here are consistent with the pecking order theory which underlines the inverse relation between financial leverage and firm profitability (Myers and Majluf, 1984).

As summarized in the literature review, the relevant literature did not reach a consensus on the association between financial leverage and both firm profitability and valuation. When we go over the comparable studies, we see large bodies of studies documenting either positive or negative impacts. Our study falls into a smaller group of research that reported contradictory results at the same time. The findings presented here are closest to those of El-Sayed Ebaid (2009) whose analyses suggested that the ratio of short-term debt to total assets had a negative impact on ROA but positive effect on ROE. From the air transport industry point of view, the only comparable study is Malighetti et al. (2011) which tested the determinants of the Tobin`s Q for airlines and airport companies. We should note that our findings of no significant impact of size and leverage on Tobin`s Q differs from those of Malighetti et al. (2011) that suggested a positive impact on these two parameters on Tobin`s

[4] See Pouraghajan et al. (2012), Le an Phan (2017), Khan (2012), Chinaemerem and Anthony (2012), Javed et al. (2015), Khatab, et al. (2011), Muritala (2018), Twairesh (2014) and Vătavu (2015) for the research indicating that both ROA and ROE move in the same direction with changing financial leverage.

Q. However, we should also underline that not only the formulations of Tobin`s Q, but also the composition of the explanatory variables are quite different in these studies. Whereas Malighetti et al. (2011) largely employed operational and locational variables, we mostly rely on financial variables in this paper. Therefore, these two studies bring their own insights to the relevant literature. As noted in the introduction, this study examined the linkage between capital structure and profitability in the airport industry for the first time in the literature and this is the main contribution of the paper.

The findings presented here are critical for airport companies from the financial management point of view. The results of our analyses suggest that finance managers of the airport companies should abstain from maintaining high levels of financial leverage. When new financing is needed, they should first resort to internal financing and equity rather than debt. However, we should note that this is quite challenging especially when the airport companies need to launch large infrastructure investments (such as new runway) that are difficult to finance without debt. The finding that the ROA and ROE move in opposite directions with increasing financial leverage is also noteworthy. As discussed earlier in this paper, ROA is a more realistic parameter than ROE to measure the financial health of the firms. Therefore, we interpreted our findings based on the changes in ROA.

A qualitative questionnaire implemented to the finance managers and top executives of the airport companies would be a good complement for future research to clarify the dynamics and motivations behind their capital structure decisions.

References

Abor, J. (2005). The effect of capital structure on profitability: an empirical analysis of listed firms in Ghana. *The journal of risk finance,* 6(5), 438-445.

Abor, J. (2007). Debt policy and performance of SMEs: Evidence from Ghanaian and South African firms. *The Journal of Risk Finance,* 8(4), 364-379.

Bandyopadhyay, A. and Barua, N. M. (2016). Factors determining capital structure and corporate performance in India: Studying the business cycle effects. *The Quarterly Review of Economics and Finance,* 61, 160-172.

Campello, M. (2006). Asset tangibility and corporate performance under external financing.

Caponianco, H. M. P. and Fernandes, E. (2004). Capital structure in the world airline industry. *Transportation Research Part A: Policy and Practice,* 38(6), 421-434.

Chinaemerem, O. C. and Anthony, O. (2012). Impact of capital structure on the financial performance of Nigerian firms. *Oman Chapter of Arabian Journal of Business and Management Review*, 1(12), 43-61.

Drobetz, W., Gounopoulos, D., Merikas, A. and Schröder, H. (2013). Capital structure decisions of globally-listed shipping companies. *Transportation Research Part E: Logistics and Transportation Review*, 52, 49-76.

El-Sayed Ebaid, I. (2009). The impact of capital-structure choice on firm performance: empirical evidence from Egypt. *The Journal of Risk Finance,* 10(5), 477-487.

Francis, G., Humphreys, I., and Fry, J. (2002). The benchmarking of airport performance. *Journal of air transport management*, 8(4), 239-247.

Fernandes, E. and Caponianco, H. M. P. (2001). Airline capital structure and returns. *Journal of Air Transport Management,* 7(3), 137-142.

Fosu, S. (2013). Capital structure, product market competition and firm performance: Evidence from South Africa. *The quarterly review of economics and finance,* 53**,** 140-151.

Graham, A. and Dennis, N. (2007). Airport traffic and financial performance: a UK and Ireland case study. *Journal of Transport Geography*, 15(3), 161-171.

Hasan, M. B., Ahsan, A. M., Rahaman, M. A. and Alam, M. N. (2014). Influence of capital structure on firm performance: Evidence from Bangladesh. *International Journal of Business and Management,* 9(5)**,** 184-194.

Humphreys, I. and Francis, G. (2002). Performance measurement: a review of airports. *International journal of transport management*, 1(2), 79-85.

Javed, Z. H., Rao, H. H., Akram, B. and Nazir, M. F. (2015). Effect of financial leverage on performance of the firms: Empirical evidence from Pakistan. *SPOUDAI-Journal of Economics and Business*, 65(1-2), 87-95.

Jensen, M. C. and Meckling, W. H. (1976). Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of financial economics,* 3(4)**,** 305-360.

Kato, K., Uemura, T., Indo, Y., Okada, A., Tanabe, K., Saito, S., ... and Migita, K. (2011). Current accounts of Japanese airports. *Journal of Air Transport Management*, 17(2), 88-93.

Khan, A. G. (2012). The relationship of capital structure decisions with firm performance: A study of the engineering sector of Pakistan. *International Journal of Accounting and Financial Reporting,* 2(1)**,** 245-262.

Khatab, H., Masood, M., Zaman, K., Saleem, S. and Saeed, B. (2011). Corporate governance and firm performance: A case study of Karachi stock market. *International Journal of Trade, Economics and Finance*, 2(1), 39-43.

Kyereboah-Coleman, A. (2007). The impact of capital structure on the performance of microfinance institutions. *The Journal of Risk Finance,* 8**,** 56-71.

Le, T. P. V. and Phan, T. B. N. (2017). Capital structure and firm performance: Empirical evidence from a small transition country. *Research in International Business and Finance,* 42**,** 710-726.

Macario, R. (2010). Airports of the future: essentials for a renewed business model. European *Journal of Transport and Infrastructure Research.* 8(2), 165-182.

Majumdar, S. K. and Chhibber, P. (1999). Capital structure and performance: Evidence from a transition economy on an aspect of corporate governance. *Public Choice,* 98(3-4)**,** 287-305.

Malighetti, P., Meoli, M., Paleari, S. and Redondi, R. (2011). Value determinants in the aviation industry. *Transportation Research Part E: Logistics and Transportation Review,* 47(3)**,** 359-370.

Margaritis, D. and Psillaki, M. (2007). Capital structure and firm efficiency. *Journal of Business Finance & Accounting,* 34(9-10)**,** 1447-1469.

Margaritis, D. and Psillaki, M. (2010). Capital structure, equity ownership and firm performance. *Journal of banking & finance,* 34(3)**,** 621-632.

Martin, J. C. and Roman, C. (2001). An application of DEA to measure the efficiency of Spanish airports prior to privatization. *Journal of Air Transport Management*, 7(3), 149-157.

Muritala, T. A. (2018). An empirical analysis of capital structure on firms' performance in Nigeria. *International Journal of Advances in Management and Economics.* 1(5), 116-124.

Memon, F., Bhutto, N. A. and Abbas, G. (2012). Capital structure and firm performance: A case of textile sector of Pakistan. *Asian Journal of Business and Management Sciences,* 1(9)**,** 9-15.

Myers, S. C. and Majluf, N. S. (1984). Corporate financing and investment decisions when firms have information that investors do not have. *Journal of financial economics,* 13(2)**,** 187-221.

Lin, L. C. and Hong, C. H. (2006). Operational performance evaluation of international major airports: An application of data envelopment analysis. *Journal of Air Transport Management*, 12(6), 342-351.

Oum, T. H., Yu, C. and Fu, X. (2003.) A comparative analysis of productivity performance of the world's major airports: summary report of the ATRS global airport benchmarking research report—2002. *Journal of Air Transport Management*, 9(5), 285-297.

Oum, T. H. and Yu, C. (2004). Measuring airports' operating efficiency: a summary of the 2003 ATRS global airport benchmarking report. *Transportation Research Part E: Logistics and Transportation Review*, 40(6), 515-532.

Oum, T. H., Adler, N. and Yu, C. (2006). Privatization, corporatization, ownership forms and their effects on the performance of the world's major airports. *Journal of Air Transport management*, 12(3), 109-121.

Pacheco, R. R., Fernandes, E. and de Sequira Santos, M. P. 2006. Management style and airport performance in Brazil. *Journal of Air Transport Management*, 12(6), 324-330.

Parker, D. (1999). The performance of BAA before and after privatisation: A DEA study. *Journal of Transport Economics and Policy*, 33(2), 133-145.

Pires, H. M. and Fernandes, E. (2012). Malmquist financial efficiency analysis for airlines. *Transportation Research Part E: Logistics and Transportation Review,* 48(5)**,** 1049-1055.

Pouraghajan, A., Malekian, E., Emamgholipour, M., Lotfollahpour, V. and Bagheri, M. M. (2012). The relationship between capital structure and firm performance evaluation measures: Evidence from the Tehran Stock Exchange. *International journal of Business and Commerce,* 1(9)**,** 166-181.

Twairesh, A. E. M. (2014). The Impact of Capital Structure on Firm's Performance Evidence from Saudi Arabia. *Journal of Applied Finance and Banking*, 4(2), 183-193.

Usami, M. and Akai, N. (2012). Financial performance of airport terminal companies in Japan–Harmful effects of government participation. *Journal of Air Transport Management*, 25, 40-43.

Vatavu, S. (2015). The impact of capital structure on financial performance in Romanian listed companies. *Procedia Economics and Finance*, 32, 1314-1322.

Vogel, H. A. (2006). Impact of privatisation on the financial and economic performance of European airports. *The Aeronautical Journal*, 110(1106), 197-213.

Vogel, H. A. (2011). Do privatized airports add financial value?. *Research in Transportation Business & Management*, 1(1), 15-24.

Zeitun, R. and Tian, G. (2014). Capital structure and corporate performance: evidence from Jordan. *The Australasian Accounting Business & Finance Journal,* 1(4), 40-61.

Appendix

Table A1. Sample of airport companies

Airport	Country	Years Covered
Belgrade Nikola Tesla Airport	Serbia	2011-2014
Ljubljana Jože Pučnik Airport	Slovenia	1998-2014
Florence Airport	Italy	2000-2014
Airports Corporation of Vietnam	Vietnam	2016
LHR Airports	United Kingdom	1989-2006
Malta International Airport	Malta	2003-2016
Save Group	Italy	2005-2016
Toscana Aeroporti	Italy	2007-2016
Fraport AG	Germany	2001-2016
Vienna International Airport	Austria	1992-2016
Flughafen Zurich	Switzerland	1994-2016
Aena SME	Spain	2015-2016
Aeroports de Paris	France	2006-2016
Airports of Thailand	Thailand	2004-2017
Auckland International Airport	New Zealand	1999-2017
Beijing Capital International Airport	China	2000-2016
Grupo Aeroportuario del Centro Norte	Mexico	2009-2016
Grupo Aeroportuario del Pacifico	Mexico	2007-2016
Grupo Aeroportuario del Sureste	Mexico	2000-2016
Guangzhou Baiyun International Airport	China	2003-2016
HNA	Japan	2002-2016
Japan Airport Terminal	Japan	1997-2017
Københavns Lufthavne	Denmark	1994-2016
Malaysia Airports Holdings	Malaysia	1999-2016
Shenzhen Airport	China	1998-2016
Sydney Airport	Austalia	2002-2016
TAV Airports Holding	Turkey	2007-2016
Xiamen International Airport	China	1996-2016
Shanghai International Airport	China	1998-2016

Table A2. Panel Data Estimation Results (Panel A)

	ROA	ROA	ROA	ROA	ROA	ROA	ROA	ROA	ROA
	FE	RE	OLS	FE	RE	OLS	FE	RE	OLS
Total leverage	-0.04***	-0.04***	-0.02***						
	(3.28)	(3.49)	(3.16)						
Short-term leverage				-0.01	-0.02	-0.03**			
				(0.48)	(1.28)	(2.32)			
Long-term leverage							-0.04***	-0.03***	-0.02**
							(2.96)	(2.89)	(2.28)
Size	0.01***	0.01***	0.00	0.01***	0.01***	-0.00	0.01***	0.01***	-0.00
	(5.55)	(4.23)	(0.08)	(4.86)	(3.25)	(0.55)	(5.35)	(3.91)	(0.20)
Tangibility	-0.10***	-0.09***	-0.04***	-0.12***	-0.11***	-0.05***	-0.11***	-0.10***	-0.03***
	(5.65)	(5.75)	(2.87)	(6.90)	(6.63)	(3.76)	(6.04)	(5.83)	(2.65)
Growth	0.00	-0.00	-0.00	0.00	-0.00	-0.00	0.00	-0.00	-0.00
	(0.14)	(0.14)	(0.41)	(0.17)	(0.23)	(0.73)	(0.13)	(0.15)	(0.40)
Holding	-0.03	-0.00	0.00	-0.02	-0.00	0.00	-0.03	-0.00	0.00*
	(1.08)	(0.70)	(1.38)	(0.92)	(0.70)	(0.80)	(1.07)	(0.43)	(1.69)
Lagged ROA	0.53*** (15.84)	0.56***	0.68***	0.55***	0.58***	0.70***	0.53***	0.56***	0.68***
		(16.98)	(21.42)	(16.10)	(17.72)	(22.90)	(15.48)	(16.74)	(21.50)
Constant	0.07***	0.08***	0.06**	0.08***	0.09***	0.07**	0.07***	0.08***	0.05*
	(3.14)	(5.11)	(1.98)	(3.41)	(5.59)	(2.35)	(3.18)	(4.93)	(1.79)
R^2	0.42	0.55	0.67	0.42	0.56	0.67	0.41	0.55	0.67
F-value	73.59		22.66	69.90		22.26	72.88		22.25
Prob > F	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000
Wald Test		464.00			443.03			456.37	
Prob > Chi^2		0.0000			0.0000			0.0000	
Breusch-Pagan LM Test		21.73			12.40			19.08	
Prob > Chi^2		0.0000			0.0002			0.0000	
Hausman Test	24.57			59.58			29.44		
Prob > Chi^2	0.0000			0.0000			0.0000		
Wald Test for heteroskedasticity	935.31			807.29			790.43		
Prob > Chi^2	0.0000			0.0000			0.0000		
Woolridge test	52.974			56.286			68.416		
Prob > F	0.0000			0.0000			0.0000		
Number of groups	29	29	-	29	29	-	29	29	-
Number of observations	416	416	416	416	416	416	416	416	416

Notes: (1) Sale figures (to measure size) in natural logs. (2) t and z-statistics in parenthesis based on robust regressions. (3) ***, **, and * stand for significance levels at 1%, 5%, and 10%, respectively. (4) Year dummies for OLS regressions not shown.

Table A2. Panel Data Estimation Results (Panel B)

	ROE FE	ROE RE	ROE OLS	ROE FE	ROE RE	ROE OLS	ROE FE	ROE RE	ROE OLS
Total leverage	0.06** (2.28)	0.06*** (2.76)	0.05*** (3.45)						
Short-term leverage				0.06 (1.39)	0.04 (0.97)	0.02 (0.59)			
Long-term leverage							0.03 (1.38)	0.05** (2.36)	0.06*** (3.57)
Size	0.03*** (5.22)	0.01*** (3.32)	-0.00 (0.67)	0.03*** (5.75)	0.02*** (4.24)	0.00 (0.54)	0.03*** (5.56)	0.01*** (3.47)	-0.00 (0.62)
Tangibility	-0.17*** (4.79)	-0.14*** (4.60)	-0.04* (1.79)	-0.14*** (4.34)	-0.12*** (3.91)	-0.02 (0.95)	-0.15*** (4.46)	-0.14*** (4.44)	-0.05** (2.16)
Growth	0.001 (0.63)	0.00 (0.35)	0.00 (0.56)	0.00 (0.57)	0.00 (0.39)	0.00 (0.82)	0.00 (0.62)	0.00 (0.34)	0.00 (0.44)
Holding	-0.05 (1.12)	-0.00 (0.08)	0.01** (2.38)	-0.06 (1.22)	-0.00 (0.01)	0.01** (2.18)	-0.06 (1.15)	-0.00 (0.25)	0.01* (1.89)
Lagged ROE	0.59*** (17.53)	0.63*** (19.04)	0.75*** (23.65)	0.59*** (17.46)	0.64*** (19.24)	0.77*** (24.41)	0.59*** (17.64)	0.63*** (19.33)	0.75*** (23.94)
Constant	0.05 (1.13)	0.08*** (2.73)	0.04 (0.79)	0.03 (0.80)	0.06** (2.11)	0.02 (0.28)	0.04 (1.00)	0.09*** (2.84)	0.06 (1.06)
R^2	0.41	0.58	0.68	0.37	0.57	0.67	0.41	0.59	0.68
F-value	66.68		24.15	65.58		23.12	65.57		24.23
Prob > F	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000
Wald Test		441.95			429.74			440.10	
Prob > Chi^2		0.0000			0.0000			0.0000	
Breusch-Pagan LM Test		23.73			33.28			18.82	
Prob > Chi^2		0.0000			0.0000			0.0000	
Hausman Test	51.90			103.00			50.44		
Prob > Chi^2	0.0000			0.0000			0.0000		
Wald Test for heteroskedasticity	944.99			931.85			1014.69		
Prob > Chi^2	0.0000			0.0000			0.0000		
Woolridge test	64.949			81.042			63.173		
Prob > F	0.0000			0.0000			0.0000		
Number of groups	29	29	-	29	29	-	29	29	-
Number of observations	416	416	416	416	416	416	416	416	416

Notes: (1) Sale figures (to measure size) in natural logs. (2) t and z-statistics in parenthesis based on robust regressions. (3) ***, **, and * stand for significance levels at 1%, 5%, and 10%, respectively. (4) Year dummies for OLS regressions not shown.

Table A2. Panel Data Estimation Results (Panel C)

	Tobin's Q	Tobin's Q	Tobin's Q	Tobin's Q	Tobin's Q	Tobin's Q	Tobin's Q	Tobin's Q	Tobin's Q
	FE	RE	OLS	FE	RE	OLS	FE	RE	OLS
Total leverage	9.67 (0.58)	2.65 (0.34)	8.23 (1.28)						
Short-term leverage				2.60 (0.10)	3.60 (0.22)	5.13 (0.38)			
Long-term leverage							8.33 (0.51)	2.33 (0.27)	9.01 (1.24)
Size	-1.67 (0.47)	-0.76 (0.59)	-1.52 (1.40)	-1.19 (0.35)	-0.63 (0.52)	-1.10 (1.07)	-1.51 (0.43)	-0.72 (0.56)	-1.48 (1.37)
Tangibility	11.08 (0.48)	6.54 (0.46)	6.24 (0.52)	15.79 (0.73)	8.07 (0.57)	10.57 (0.90)	12.11 (0.53)	6.38 (0.43)	4.72 (0.38)
Growth	-0.05 (0.07)	-0.03 (0.04)	-0.05 (0.08)	-0.06 (0.07)	-0.01 (0.01)	0.02 (0.03)	-0.05 (0.06)	-0.03 (0.04)	-0.07 (0.11)
Holding	3.56 (0.12)	1.47 (0.46)	1.36 (0.52)	2.75 (0.09)	1.60 (0.48)	1.50 (0.55)	3.49 (0.11)	1.35 (0.42)	0.91 (0.34)
Lagged Tobin's Q	0.79*** (40.76)	0.78*** (45.32)	0.73*** (39.45)	0.79*** (40.71)	0.78*** (45.33)	0.73*** (39.36)	0.79*** (40.70)	0.78*** (45.32)	0.73*** (39.43)
Constant	-5.53 (0.20)	-2.98 (0.25)	0.94 (0.04)	-8.08 (0.29)	-4.40 (0.37)	-4.26 (0.17)	-5.53 (0.19)	-2.59 (0.21)	3.63 (0.14)
R^2	0.84	0.84	0.91	0.84	0.84	0.90	0.84	0.84	0.91
F-value	281.14		103.13	280.83		102.66	281.06		103.10
Prob > F	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000
Wald Test		2078.56			2078.12			2078.26	
Prob > Chi^2		0.0000			0.0000			0.0000	
Breusch-Pagan LM Test		0.00			0.00			0.00	
Prob > Chi^2		1.0000			1.0000			1.0000	
Hausman Test	1.91			1.65			1.88		
Prob > Chi^2	0.9278			0.9491			0.9308		
Wald Test for heteroskedasticity	1.7e+09			3.0e+08			1.9e+09		
Prob > Chi^2	0.0000			0.0000			0.0000		
Woolridge test	132541.996			134743.839			125109.053		
Prob > F	0.0000			0.0000			0.0000		
Number of groups	28	28	-	28	28	-	28	28	-
Number of observations	391	391	391	391	391	391	391	391	391

Notes: (1) Sale figures (to measure size) in natural logs. (2) t and z-statistics in parenthesis based on robust regressions. (3) ***, **, and * stand for significance levels at 1%, 5%, and 10%, respectively. (4) Year dummies for OLS regressions not shown.

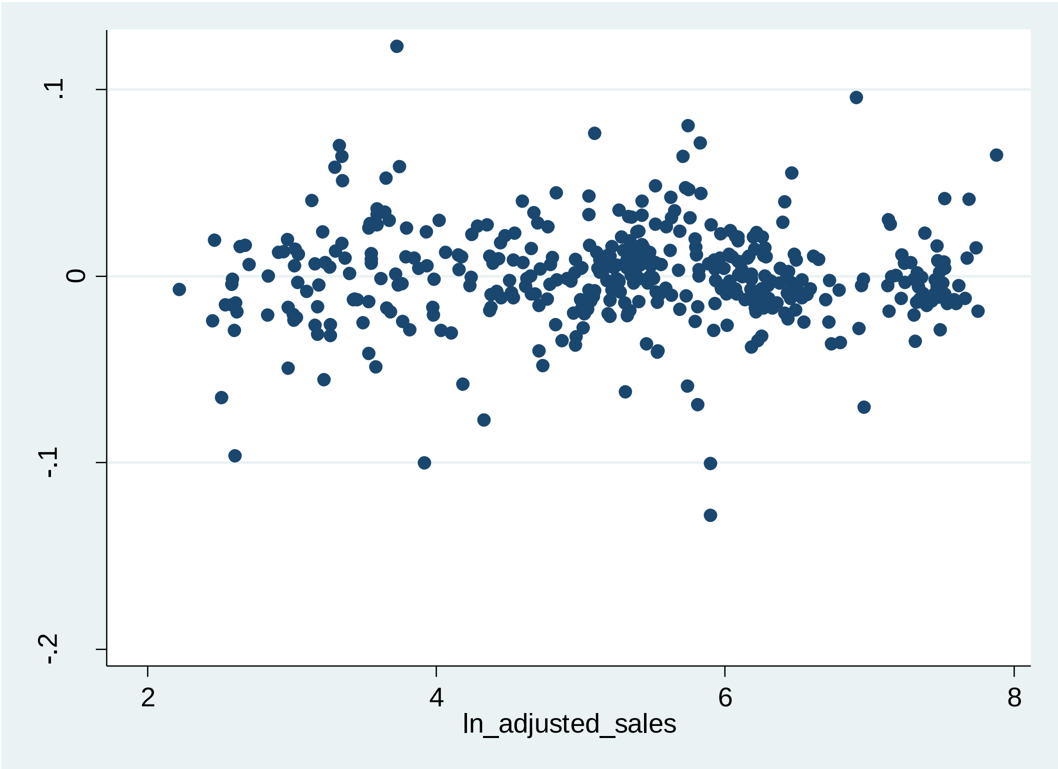

Figure 1. *Residual vs SIZE Plot*