Do Private Firms Perform Better than Public Firms?

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Abstract

This paper examines the financial performance of listed public firms vs. unlisted private firms in the U.K. over the period 2003-2012. We establish a stylized fact that private firms typically outperform public firms. This finding is robust in various model settings, using alternative matching samples, different definitions of performance, changes in ownership status, and the endogeneity of a firm's listing decision. We then identify and test three channels that explain higher performance of private firms, and two "counter" channels that favor public firms. First, private firms are more efficient operationally than public firms due to managerial flexibility. Second, the R&D intensity is higher for private than public firms, indicating longer time horizon. Third, private firms have higher controlling ownership, which reduces agency cost. Considering counter channels, we find that the basic result is independent of liquidity or financial resources as the operating profitability is higher for private firms than public firms when they both are financially constrained.

Keywords: private firm, public firm, corporate ownership, exchange listing, operating profit, firm performance

JEL Codes: G32, G34

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I. Introduction

While publicly-held listed companies ("public firms") typically constitute the majority of investors' equity investment holdings, they represent only a small fraction of all firms in the economy. For example, in our sample of U.K. industrial firms from the Orbis database, only about 2% of all firms are public firms.[1] Not only are there substantially more privately-held unlisted firms ("private firms") than public firms, but their economic significance is also greater. Asker, Farre-Mensa and Ljungqvist (2014) estimate that private firms accounted for about 69% of private sector employment, 59% of sales and 49% of aggregate pre-tax profits in the U.S. In our Orbis database of U.K. companies, private firms account for 70% of total corporate assets, 65% of total sales, and 59% of after-tax corporate profits in 2010.

The purpose of this paper is to investigate the existence and nature of systematic differences in financial performance between private and public industrial firms in the U.K. and to examine channels that influence the relative performance. The basic characteristics of U.K. firms and capital markets are similar to those of U.S. in many respects including ownership and governance, corporate finance, legal tradition, and so forth. As such, this paper may be viewed as contributing to an emerging literature that uses newly available datasets to identify differences between public and private firms in the Anglo-American world. Gao, Harford and Li (2013) study U.S. firms and find that public firms hold about twice as much cash as private firms. Asker, Farre-Mensa and Ljungqvist (2014) find that public firms invest less and are also less responsive to changes in investment opportunities than private firms in the U.S. For U.K. firms, Ball and Shivakumar (2005) find that the quality of financial reporting by private firms is lower than public firms even though they face equivalent regulations on auditing, accounting standards and taxes. These differences in the quality of information may help explain the findings on U.K. firms by Brav (2009) and Saunders and Steffen (2011) that private firms face significantly higher financing costs than public firms due to their higher reliance on debt and private capital. On the other hand, Michaely and Roberts (2012) report that public firms pay relatively higher dividends and tend to smooth dividends more than private firms in the U.K. While some of these studies have implications for firm performance, we are not aware of any comprehensive, economy-wide study of the performance of private vs. public U.K. firms.[2]

[1] When the complete universe of firms are considered (Bureau van Dijk Orbis database, 26 Sep 2013 edition), 98.3% of all firms in the UK (281,608 of 286,479 firms) or 99.2% of all firms in the US (1,943,181 out of 1,959,180 firms) are unlisted private firms.

[2] We became aware of an accounting working paper by Allee, Badertscher and Yohn (2013) that shows that lower *future* profitability of public than private firms is driven by lower *future* profit margins; we find this finding a bit circular in nature as it only explains the connection between the two future relative profitability variables. The earlier contribution by Ke, Petroni, and Safieddine (1999) uses a very small sample of public and private *U.S. insurance* companies, to show that the operating profitability of public and private firms are not significantly different from each other. We are not aware of any research that systematically investigates the relative *contemporaneous* profitability of private versus public firms in a comprehensive way.

In this paper, we establish a stylized fact on the relative financial performance of private vs. public industrial firms and investigate several channels through which this may come about. A study of the relative performance of private and public firms is worthwhile because the extant literature on public vs. private ownership points to several potential advantages of public ownership. An implication of the literature on initial public offering (IPO) (e.g., a survey article by Roell (1996)) is that public firms have advantages over private firms in accessing capital (Pagano, Panetta and Zingales (1998), Saunders and Steffen (2011)), and in resultant capacity to invest in profitable projects. Gao, Lemmon and Li (2013) compared executive pays in U.S. public and private firms and found that remuneration in public firms is more sensitive to firm performance. Public firms also enjoy more prestige and reputation, which may help them attract profitable businesses and talented employees.

However, private firms may also have advantages over public firms as well. For instance, private firms face less agency costs (Gao, Harford, and Li (2013), and Akguc and Choi (2014)), as well as avoid listing costs, and may not have to disclose strategic information (Brau and Fawcett (2006) and Farre-Mensa (2014)). Graham, Harvey, and Rajgopal (2005) document a survey result that the majority of the Chief Financial Officers of public firms would not take on a positive NPV project if it would lead them to miss quarterly earnings targets. If so, private firms may be able to make decisions in the long-term interest of the firm, free from pressures of short-term market reactions or analyst earnings forecasts. Asker, Farre-Mensa and Ljungqvist (2014) find that private firms invest more than public firms in the U.S. and are more responsive to investment opportunities, which they attribute to managerial myopia of public-firm managers. Additionally, given controlled ownership structure, private firms may have a lower agency cost, and may even have a greater incentive, as Bhide (1993) argues, to engage in close monitoring of management than public firm shareholders as they typically do not have an easy option to exit. This implies that management may be more proactive in making decisions to enhance longer-term firm performance in private firms more than in public firms.[3]

In sum, private firms (a) may have a potential advantage in management flexibility, (b) may have a longer investment time horizon than public firms, and (c) may have a lower agency cost including no listing costs and not having to release sensitive strategic information. On the other hand, public firms have advantage in liquidity due to better access to capital markets. In addition, public firms may have better reputation and visibility than private firms. Assessment of the net effect is an empirical issue.

[3] Admati and Pfleider (2009) argue that shareholder activism or the threat of the "Wall Street walk" can have a disciplining impact on managers of public firms. The latter refers to a situation whereby major institutional shareholders sell stocks whose performance is below expectations, resulting in further fall in share prices. However, the management is acutely aware of this threat and can take action to prevent this from happening. We do not consider this "activist" channel in this paper, except to note that private firms would be far less vulnerable to such threat.

Our empirical results show that private firms typically have higher operating profitability than public firms. In univariate analysis, an average private firm has a higher ROA than an average public firm by 3.9% in unmatched full sample, by 3.0% in industry and size-matched sample, and by 4.0% in propensity score matched sample. (Comparable differences in ROE are 17.7%, 16.2%, and 15.7%, in respective samples). In multivariate analysis, the difference in ROA range from 4.4% in unmatched sample, and 2.3% in matched sample (14.9% and 10.3%, respectively, in ROE). These findings are robust to alternative definitions of operating performance as well as the use of median difference rather than the mean difference. We also find that private firms add to their profitability more than public firms each year on average.

The choice of public vs. private firms, however, may not be exogenous and may create an identification problem if the factors that affect profitability also affect the firm's organizational choice. To deal with this potential endogeneity issue, we use an instrumental variables approach. Following Saunders and Steffen (2011), we use the geographic distance between a firm's headquarter and London as an instrument. We find that firms located closer to London are more likely to be publicly listed. The two-stage least squares estimation shows that an average private firm is 7.4% more profitable (measured in ROAs) than an average public firm, lending further support to our main finding and alleviating concerns over endogeneity. A separate two-stage analysis based on the Heckman self-selection bias test adds to the robustness of the result.

As a further robustness test, we look at a subsample of firms that conducted IPOs during our sample period. This setup allows us to compare a firm's operating performance before an IPO (i.e., the firm is private) and after an IPO (i.e., the firm is public). We find that mean and median operating profitability is higher before an IPO, which supports our main findings, and is consistent with the findings in the literature that performance declines after IPO (e.g., Pagano, Panetta, Zingales, 1998, Pastor, Taylor and Veronesi 2009).

Having established that private firms, on average, perform better than public firms, we now consider channels through which that may come out. We examine three possible channels and two "counter" channels that favor public firms. First, we investigate whether private firms are more operationally efficient than public firms due to managerial flexibility. Second, we examine whether private firms invest in more R&D relative to total assets than public firms because of their longer time horizon. Third, we consider whether private ownership structure is advantageous because of a lower agency cost. As "counter" channels, we also examine whether the above result stands because of apparent advantage of public firms in terms of liquidity and reputation.

First, unencombered by pressures of short-term market pressures and analyst earnings targets, the management of private firms may be freer to push for higher operational efficiency and productivity, leading to

higher profitability. We find such result and attribute the difference in operating profitability party to private firms' higher operating efficiency. Such inference is supported by our finding that the private firms are nimbler to respond to market opportunities and challenges as evidenced by having higher asset turnover rates, lower collection period and faster payment to suppliers. Specifically, in multivariate analysis, we show that average tangible fixed assets turnover for private firms is 26.8% higher than that of average public firms in unmatched sample (and 16.4% in the matched sample). Also, In unmatched (matched) sample, it takes 31.1% (43.3%) less time for an average private firm to collect its credit account and 37.1% (41.1%) less time to pay its suppliers than an average private firm.

Second, we find that the R&D investment lowers contemporaneous firm profitability, but less so for private firms. When we look at the effect of total R&D investments relative to total assets in the past three years (i.e., R&D stock) on current profitability, we again find that the reduction in profitability is less for private firms than it is for public firms, implying that the value of R&D is higher for private firms. We also investigate whether economically significant R&D investment increases affect future operating performance differently for public and private firms. We find that operating performance for private firms is higher than for public firms one and two years after a significant R&D investment increase. These results are consistent with Asker et al. (2014) that public firms invest less and are less responsive to changes in investment opportunities compared to private firms, suggesting that public firms may suffer from managerial myopia. Also, given the informational asymmetry of R&D, the internalization theory (Buckley (2009)) suggests that the value of R&D investment accrued through internal market may be greater than its value in open market, implying that the higher internal value of R&D may lead to higher R&D intensity for private firms than public firms.

Third, regarding the effect of ownership controls on profitability, we find that 81.5 % of all private firm-year observations have at least one dominant shareholder whose ownership is at least 50%, while this ratio is only 9.8% for public firm-year observations. However, 67.7% of all public firm-year observations have shareholders with no more than 25% ownership in the company, while it is only 3.6% for private firms. Clearly, the majority of private firms have a controlling owner while public firms often have dispersed ownership. To address the impacts of controlling ownership, we split the sample into three groups based on ownership percentages: (a) no shareholder owns more than 25%, (b) at least one shareholder owns more than 25% but no shareholder holds more than 50%, and (c) one shareholder owns more than 50% of all shares outstanding. In each ownership group, we again find that private firms are more profitable than public firms. The differences are more pronounced in controlling ownership sample (i.e.,

case c) than it is in a dispersed ownership sample (i.e., case a). This is consistent with the benefit of private firms due to lower agency cost compared to public firms.[4]

We also consider two "counter" channels that favor public firms. As a rule, we expect public firms to be more liquid or have more financial resources than private firms because of access to public capital markets. Following Hadlock and Pierce (2010), we classify all firms as financially constrained or unconstrained and find that the difference in operating profitability of private and public firms is even higher when both types of firms are financially constrained.[5] It is noteworthy that the higher operational efficiency of private firms is not at the expense of less liquidity or more volatility. We show that private firms have higher liquidity and more operating profit available per dollar of interest paid compared to an average public firm. Cash flow volatility is also lower for an average private firm although private firms on average have higher debt ratios.[6] Even though the unit employee cost is somewhat higher, private firms have significantly higher labor productivity measured by profit or revenue per employee than comparable public firms. Additionaly, we find that the basic stylized fact remains when we consider reputation of firms.

In sum, private firms are more profitable than public firms in the UK. We attribute this to superior operational efficiency and labor productivity of private firms despite higher debt ratios, inferior access to capital markets and lower reputational considerations. compared to public firms,

The rest of the paper proceeds as follows. In section II, we discuss data and provide summary statistics. In section III, we establish a stylized fact that private firms outperform public firms under various modelling and data assumptions. In section IV, we examine the channels that influence the relative firm performance. Section V concludes.

[4] Anderson and Reeb (2003) make a similar point with respect to family ownership and firm performance in the U.S. However, they only use listed public firms controlled by family, not private firms. Because of the lack of data on family-owned private vs. public firms in U.K., we leave this to future work.

[5] The Kaplan and Zingales (1997) index, as introduced in Lamont, Polk, and Saa-Requejo (2001), is a common measure of financial constraints used in the literature. However, we cannot calculate it for private firms as the KZ index includes a firm's stock price, unavailable for private firms. .

[6] Interestingly contrary to the finding of Asker at al. (2013) for U.S. firms, our analysis of U.K. firms indicates that public firms have greater investment proclivity relative to total assets than private firms. As to what explains this difference, we leave it to future work.

II. Data Description and Univariate Analysis

IIa. Sample construction

The main data for this study is sourced from *ORBIS,* which provides information for over 100 million publicly listed and privately held firms across 207 countries.[7] To construct our dataset, we start with all firms located in the United Kingdom from 2003 to 2012. We exclude small companies that are not required for external audit. As this requirement changed over time, we drop firms with an annual operating income of less than £1 million (or total assets of less than £1.4 million) in 2003, less than £5.6 million in operating income (or £2.8 million in assets) during 2004-2007, and less than £6.5 million in operating income (or £3.26 million in assets) during 2008-2012, pursuant to external audit requirement (http://www.bis.gov.uk/files/file50491.pdf). Following Brav (2009), we include the following types of incorporated entities as "private" unlisted firms: private limited, public not quoted, public quoted OFEX (off exchange), public alternative investment market (AIM) and public quoted. We only consider industrial firms excluding financial firms (SIC codes between 6000 and 6999) and regulated utilities companies (SIC codes between 4900 and 4949). We also exclude firm-year observations with inconsistent financial information (e.g. negative assets, revenue, debt, etc.) and any observation for which basic accounting identities are not satisfied. Furthermore, we require at least three years of observations to be available for each firm.

The Orbis database classifies a firm as public or private based on the firms' latest legal status. In order to correctly classify a firm as public or private over time, we search for all key dates and identify those that underwent changes in status: 325 initial public offerings and 151 delistings from the stock market during our sample period. We then reclassify a firm as public or private based on these key dates.[8] To correctly account for differences in profitability and efficiency between public and private firms, we exclude firm-year observations related to IPOs and delistings in our main analysis and examine these cases separately.

The initial sample consisted of 287,052 unique public and private firms during 2003-2012. After applying the above screening and updating the firm status as discussed, the final sample was reduced to 319,096 firm-year observations or 39,437 unique firms, consisting of 312,356 private firm observations (or 38,699 unique private firms) and 6,740 public firm observations (or 799 unique public firms).[9] Table 1 presents a summary of firm-year observations by industry in the dataset. It is striking to note that 98% of all observations represent private firms, while only 2% represent public firms. Using the Fama-French 48 industry classification scheme, three industries

[7] For detailed description of the database, see *orbis.bvdinfo.com.* As the database is continually updated, the number of observations will change over time. The data in this study was downloaded on October, 2013.
[8] For example, if a firm did an IPO in 2007, and it has financial information from 2003 to 2012, Orbis classifies this firm as public in all years since most recent status is public. We reclassify this firm as private for 2003-2006 and public for 2007-2012.
[9] Numbers do not exactly add up due to the firms that changed their ownership status by IPOs and delistings. The effects of tracking firm ownership changes will be examined later in the paper.

(business services, wholesale, construction) have the highest frequency (with 19.9%, 17.2%, and 11.6%, respectively) of total firm observations.

[Insert Table 1 about here]

In addition to the full sample of raw firm data, we also assemble a smaller matched sample of public and private firms. That is, for each year, individual public firms are matched to a private firms based on two-digit SIC industry code and asset size. To ensure a close match, we follow Asker, Farre-Mensa and Ljungqvist (2014) and impose the restriction that

$max\{Total\ Asset\ (public),\ Total\ Asset(private)\} / min\{(Total\ Asset\ (public),\ Total\ Asset(private)\} < 2$.[10]

The quality of the matches produced by this process can be seen in Figure 1. Panel A presents a plot of the distribution of total assets (in natural logarithm) for the full sample of public and private firms and the overlap between two distributions is limited. Public firms have a higher average total asset as expected and private firms show much narrower distribution around a lower average total asset. Panel B shows firm size distribution of matched sample based on 2-digit SIC code. As we match with replacement, the matched sample (based on 2-digit SIC) has 6,455 private firm-year observations representing 4,209 distinct private firms, and 6,455 public firm-year observations from 785 distinct public firms. We conduct the Wilcoxon-Mann-Whitney test to check if there is a statistically significant difference in the matched sample between the underlying distributions of total assets for public firms and total assets for private firms. The null hypothesis of no difference between private and public firms is not rejected at the 5% level for matched samples (Panel B) indicating comparability of private and public firms. For a full raw firm sample, however, the null is strongly rejected confirming the significant difference in distribution between the two firm types as shown in Panel A. We also conduct a propensity score matching for robustness later and the results are qualitatively the same.

[Insert Figure 1 about here]

IIb. Descriptive Statistics: Firm Characteristics

For each firm-year observation in the sample, a wide range of firm-specific accounting and financial data are obtained from the Orbis database. Appendix A provides detailed definitions of these variables. All monetary variables are expressed in British pound (£) and are in constant 2012 prices in millions of pounds. All ratios are scaled by the book value of total assets unless otherwise noted and all continuous variables (except for number of employees, and

[10] We obtain very similar results when we impose a more restrictive upper bound of 1.5.

number of branches) are winsorized at the 2.5% level in each tail to reduce the effect of outliers. Following Bates, Kahle and Stulz (2009), we normalized leverage ratios between 0 and 1 after winsorization.

Table 2 provides summary statistics for various firm characteristics for public and private firms for the full raw sample (Panel A) and for the matched sample (Panel B). The tests of equality of means (and medians) in Panel A reveal the heterogeneity of public and private firms. In the full sample, public firms are much larger in total assets, revenue and employment, and also older than private firms. For instance, the average public firm is around 31 years old and has 6,942 employees, the average private firm is around 25 years old and has only 353 employees. In the industry and size matched sample, the differences in means and medians of total assets between public and private firms become statistically insignificant (and in either the mean or median test for revenue, firm age and number of branches). It is noteworthy that even In the matched sample, private firms hold higher ratios of current asset to total asset (63.7%) than public firms (48.6%) while public firms have higher fixed asset ratios (51.4%) than public firms (36.3%). In fact, net working capital ratio is higher for private firms (9.9%) than public firms (1%), indicating potentially greater liquidity as well as operating efficiency. However, public firms hold more cash (15.7%) on average than private firms (10.6%), consistent with the findings of Gao, Harford and Li (2013), Farre-Mensa (2014), and Akguc and Choi (2014). As reported by Brav (2009), private firms have higher debt ratios than public firms and rely more on short term debt.

[Insert Table 2 about here]

Table 3 provides pairwise correlations among the key variables for the full sample (Panel A) and the matched sample (Panel B). In general, estimated correlations are quite low, the highest one is 0.31 in the full sample and 0.55 in the matched sample, involving the relation between market share and the log of total asset.

[Insert Table 3 about here]

IIc. Univariate Analysis of Relative Firm Performance

Table 4 presents six dimensions of firm performance indicators in both means and medians for public and private firms for full unmatched (Panel A) and for matched samples (Panel B). Firm performances are assessed by six dimensions of 30 financial and economic firm-specific variables: profitability, efficiency, productivity, structural ratios, growth, and volatility. The unmatched and matched samples, however, give virtually an identical qualitative picture of public vs. private firm performances. Actually, the mean difference tests for public and private firms are exactly identical in the two panels qualitatively, although there are minor differences in medians (3 out of 30 variables differ in significance levels, albeit of same signs). We focus on discussing the results in the matched sample (Panel B).

[Insert Table 4 about here]

The most striking feature in the matched sample is that private firms are more profitable than public firms consistently, and the differences are statistically significant at 1%. The mean ROA (return on assets), defined as EBITDA (earnings before interest, taxes, depreciation and amortization) scaled by the book value of assets, is 10.3% for private firms as opposed to 8.7% for public firms. When EBIT (earnings before interest and taxes) is used, the ROA is 6.3% vs. 3.3%, respectively; using net income, it is 5.2% for private firms and 0.7% for public firms. The ROE (return on equity) is much higher than ROA for both, but the same relative performance of private and public firms remains: 44.7% for private firms and 24.5% for public firms in terms of EBITDA, and 26.6% and 10.4% in terms of EBIT, respectively. The mean ROE based on net income is 17.4% for private firms vs. 2.6% for public firms. These are further reinforced by sales statistics normalized to equity: for every pound (£) of equity, private firms generate, on average, £8.52 in sales for private firms as compared with only £3.45 for public firms. Similarly, for every £ of operating sales revenue generated, there is cash flow of £0.109 available for private firms vs. only £0.008 for public firms.[11]

We also examine the evolution of four definitions of operating profitability over time in Figure 2. As expected, the negative impact of the 2008-09 crisis is evident, but interestingly its impacts last longer in listed public firms than unlisted private firms due to the importance of market propagation of shocks during the crisis. The superior performance of private vs. public firms in both ROA and ROE remains throughout the period.

[Insert Figure 2 about here]

Profitability is driven by efficiency and productivity. The efficiency ratios indicate that private firms, on average, are more efficient than comparable public firms (Panel B of Table 4). Specifically, asset efficiency measured by tangible fixed asset turnover ratio is higher for private firms than public firms: private firms on average generate £46.96 of operating revenue per tangible fixed asset compared to £22.42 for public firms. Similarly, inventory turnover is much higher for private firms than public firms. Private firms are also more efficient in collection of receivables and in payment of their accounts. For an average private firm, it takes 46 days to collect receivables as opposed to 54 days for public for public firms, and it takes 28 days to pay suppliers for private firms vs. 39 days for public firms. Finally, the interest coverage of operating profit is much higher for private firms (27.9) than public firms (19.5).

Private firms also fare better in terms of productivity. Both profit and revenue per employee are much higher for private firms than public firms, across all three measures of profitability used. In our matched sample, EBIT per

[11] The relative performance is less clear in medians though since the effects of firm size in assets still remain to some effect even in the firm size-industry-matched sample due to the disparity in the number of private vs. public firms. For instance, public firms have higher ROA than private firms while the reverse is true in ROE. We will investigate this further later by conducting propensity score matching and in the context of multivariate analysis.

employee is £50,000 for private firms as opposed to only £4,000 for public firms; in terms of EBITDA, the labor productivity is £52,000 vs. £17,000, respectively (and 50,000 vs. 0 in net income). Revenue per employee is £591,000 for private firms compared to £179,000 for public firms. On the other side of coin, the average cost of an employee for each dollar of revenue generated is less for private firms (£0.23) than it is for public firms (£0.31). This is shown up in higher cost per employee (e.g., compensation) for private firms (£43,000) than it is for public firms (£38,000), as well as in higher equity ownership per employee for private firms (£574,000) than for public firms (£178,000).

As for structural ratios, it is surprising to see that private firms have higher liquidity ratios. Specifically, the current ratio (current assets to current liabilities) is 2.72 for private firms compared to 1.97 for public firms. Similarly, the liquidity ratio calculated as (current assets – inventory)/current liabilities) is 2.11 for private firms and 1.64 for public firms. As expected, the leverage ratios are higher for private firms (higher debt-to-equity and lower equity to asset ratios).

Despite higher operating profitability and higher efficiency, the average sales growth for private firms (11.7%) is substantially lower than that of public firms (19.4%). Private firms also have lower average employee growth (4%) than public firms (9.8%). Private and public firms also show differences in terms of investment in fixed assets. Michaely and Roberts (2012) define capital investment as growth in fixed assets from time t to t-1. Using this definition, fixed assets of private firms in our matched sample grow on average 14.6% a year compared to 27.3% for public firms (11.2% vs. 25.3% respectively in raw sample).[12] Asker, Farre-Mensa and Ljungqvist (2014), however, define investment as the annual increase in gross fixed assets from time to t to t-1 scaled by beginning of year total assets (i.e., gross investment). Using this definition, we see that gross investment for private firms in our matched (raw) sample is on average 3% (1.7%) a year compared to 9.2% (8.8%) for public firms. These findings contrast with those reported in Asker et al. (2014), who report that private firms on average invest substantially more (nearly 10%) than observably similar public firms (4%). Thus, our results support the point by Michaely and Roberts (2012) that, while the U.S. and the U.K. economic environments are similar in many respects, the investment behavior of average public and private firms in these two countries can be different and the lessons in one country do not necessarily apply to another.

As for volatility, the results are mixed. Private firms have higher earnings volatility (35.6%) than do public firms (25.8%), but operating cash flow volatility (calculated as the standard deviation of cash flow from operations)

[12] Michaely and Roberts (2012) use a sample of public and private firms in U.K. from 1993 to 2002. Fixed assets of public firms in their full sample grow on average 37% a year compared to 18% for private firms.

for an average private firm (7.5%) is less than that of public firms (9.4%). In order to ascertain the role of volatility in performance, we examine volatility-adjusted earnings performance in the next section on multivariate analysis.

Overall, the univariate analysis presented in this section shows that, for both the full sample and the industry-size matched sample, private firms on average are more profitable than public firms. Private firms are also more operationally efficient and productive, but with ambiguous structural and volatility results relative to public firms. Private firms, however, seem to have lower growth rates than public firms. These preliminary findings will be examined further in multivariate context, with an eye toward establishing a stylized fact regarding the relative performance of private vs. public firms as well as examining channels that produce such results.

III. Multivariate Analysis of Public vs. Private Firm Performance

In this section, we estimate the relative profitability of public and private firms under varying modeling assumptions and data. In section IV, we will then assess the viability of several channels that could bring about such results.

IIIa. The relative profitability of public and private firms: A baseline model

We first estimate a baseline model of relative firm performance that takes the form:

$$Profitability_{it} = \beta_0 + \beta_1 Public_i + \beta_2 Ln(Total\ assets)_{it} + \beta_3 Ln(Asset\ turnover)_{it} \quad (1)$$

$$+ \beta_4 (Market\ share)_{it} + \beta_5 (Sales\ growth)_{it}$$

$$+ \beta_6 Ln(Firm\ age)_{it} + \beta_7 (Firm\ risk)_{it} + \beta_8 (Leverage)_{it} + \beta_9 Ln(Unit\ employee\ cost)_{it}$$

$$+ \beta_{10} Ln(Number\ of\ branches)_{it} + industry\ dummies + year\ dummies + \varepsilon_{it}$$

where *Profitability* is an accounting-based measure of firm performance such as return on assets (EBIT/total assets, or Net income/total assets), or return on equity (EBIT/shareholders' equity, or Net income/shareholders' equity). We are limited to using accounting measures of performance because market-based performance is not avialable for private firms. A key variable of interest is *Public*, which is a dummy that takes the value of one if the firm is publicly listed and zero otherwise. The model is supplemented by other firm-specific variables including controls. *Ln(Asset turnover)* is the natural logarithm of tangible asset turnover, calculated as operating revenue divided by average tangible fixed assets during the year. *Market share* is firm's market share in sales at the 2-digit SIC level (operating revenue over total 2-digit SIC level operating revenue). *Sales growth* is the percentage increase in operating revenue from time t-1 to time t. *Ln(Firm age)* is the natural logarithm of one plus years since firm's founding. *Firm risk* is the coefficient of variation in sales, calculated as the standard deviation of sales in the past 5 years over mean of sales in

the past 5 years (requiring at least 3 years of data to be available). *Leverage* is total debt over total assets. *Ln(Unit employee cost)* is the natural logarithm of total cost of employees divided by total employees. *Ln(Number of branches)* is the natural logarithm of one plus the number of branches a firm has.

We estimate equation (1) using the pooled OLS approach with industry and year dummies and cluster standard errors at the firm level, which allows for serial correlation within firm clusters. Table 5 presents a summary of the estimation results for unmatched and industry-firm size matched samples. The public firm dummy is negative and significant in all specifications for both samples, indicating that private firms outperform public firms. The coefficients indicate that private firms on average have higher ROA than public firms by 4.4-5.6% and higher ROE by 12.7-14.9% in the raw full sample, depending on whether EBIT or Net income is used for return; in the matched sample, the net performance of private vs. public firms is 2.3-4% in ROA and 6.7-10.3% in ROE. Similar to Brav (2009), the performance difference is larger for ROE measures, which might be traceable to higher debt-to-equity ratios of private firms as seen in Table 4. The control variables show the expected signs: the profitability is positively related to the log of total asset, sales growth and asset turnover, and negatively to firm risk, leverage, and unit employee cost for most measures of profitability.

[Insert Table 5 about here]

As a robustness check, we also used two additional definitions of operating profitability, EBIT margin and Net income margin. The results are reported in Appendix B and the public firm dummy again has a significantly negative coefficient, supporting our main finding that private firms are on average more profitable than public firms. We also estimate equation 1 for public and private firms separately and test whether coefficients in two samples are statistically different from each other using a Chow test. The results are presented in Appendix B and in most cases, the hypothesis of equal coefficients across the public and private firm samples is rejected.

IIIb. Changes-in-variables model

In the baseline model, we are only able to control for observable factors. If any unobservable factor (e.g., firm culture) affects the choice of being public and profitability, then the coefficient estimate for the public firm dummy will be inconsistent and biased. We address this problem in two ways: errors-in-variables model and endogeneity estimation. In this subsection, we conduct the former and estimate the following changes-in-variables model to account for the impact of unobservable firm characteristics on firm profitability (we do the latter in the next subsection):

$$\Delta Profitability_{it} = \beta_0 + \beta_1 Public_i + \beta_2 \Delta Ln(Total\ assets)_{it} + \beta_3 \Delta Ln(Asset\ turnover)_{it} \quad (2)$$

$$+ \beta_4\ \Delta\,(\text{Market share})_{it} + \beta_5\,\Delta\,(\text{Sales growth})_{it} + \beta_6\,\text{Ln}(\text{Firm age})_{it} + \beta_7\,(\text{Firm risk})_{it}$$

$$+ \beta_8\,\Delta\,(\text{Leverage})_{it} + \beta_9\,\Delta\text{Ln}(\text{Unit employee cost})_{it} + \beta_{10}\,\text{Ln}(\text{Number. of branches})_{it}$$

$$+ \text{industry dummies} + \text{year dummies} + \varepsilon_{it}$$

where Δ indicates change from time t-1 to time t. The estimation results are presented in Table 6 for both unmatched and matched samples. The coefficient for the public firm dummy is negative and significant in all specifications and samples, indicating that an average private firm adds to its profitability each year more than an average public firm. The adjusted R^2 ranges from 6.9% to 23.8%, which are fairly high for a model in which changes are specified. These findings provide further support for the finding of private firms being relatively more profitable.

[Insert Table 6 about here]

IIIc. Endogeneity of firm ownership

Another potential issue in the presence of unobserables is concern on endogeneity. That is, one might raise the concern that some unobservable firm-specific factors might affect profitability and firm's listing decision simultaneously. In order to address this endogeneity concern, we use the two-stage instrumental variable approach, performing the Durbin-Wu-Hausman test of the public firm dummy for endogeneity. We also conduct Heckman's (1979) two-stage method to correct for sample selection bias to further alleviate the endogeneity concern.

Following Saunders and Steffen (2011), we use the distance between firm's headquarters and London, the financial center of the U.K. as an instrument.[13] A justification is that this instrument is correlated with a firm's public ownership status (i.e., we expect that firms that are closer to London are more likely to be listed) and affects profitability only through the firm's decision on ownership status. To this end, we use Google maps to measure driving distance to compute the "distance to London." Firms in our sample are located in 1,193 distinct cities throughout the U.K. and the average distance of these cities from London is 177.12 miles (or 3 hours 12 minutes by car). When we consider all observations in our sample, an average private firm is 119.78 miles and an average public firm is 83.26 miles away from London. An alternative measure of distance is the physical distance between London and the location of each firm calculated using longitudes and latitudes as normally used in the gravity models of financial flows literature. Our measure is an improvement since we consider 'driving distance' instead of the shortest physical distance which may not be practical for traveling in most cases.

[13] Saunders and Steffen (2011) study the difference in borrowing costs between publicly traded and privately held firms in U.K. In order to separate the extent to which loan spreads are driven by economic differences between private and public firms, not by an unobservable firm specific factors, they use the distance of a firm's headquarters to London's capital markets as an exogenous variation in firm's public/private choice.

We adopt a two-stage instrumental variable (IV) approach. In the first stage, we estimate a probit model of a firm's choice of an organizational form (i.e., public or private) as a function of the instrumental variable (distance between firm's location and London) and lagged values (at the beginning of year t) of firm characteristics that affect firm's organizational form, as controls. We use the predicted probability from the first stage probit model as data in the second stage as a proxy for the public firm dummy, and also in calculating lambda in Heckman's (1979) self-selection model. Estimation results for first stage probit are presented in column 1 of Table 7. The second-stage results from the instrumental variable estimation and from the Heckman selection model are shown in column 2 and 3, respectively.

[Insert Table 7 about here]

As expected, the coefficient for the distance to London is negative and statistically significant at 1% in the first stage. That is, firms located closer to London are found to be more likely to be public. The coefficient is also economically significant: the marginal effect for "distance to London" variable is
-0.0038 (holding all other variables at their mean values), meaning that as the distance to London goes down by 1 mile, the probability of being Public goes up by 0.38%. In the second stage, the coefficient for the predicted Public firm dummy is -0.074 and highly significant (and higher in magnitude than –0.044 in column 1 of Table 5). This again provides support for our main finding that private firms on average are more profitable than public firms, holding all else constant.[14] If the public firm dummy is not exogenous, then the 2SLS would be more efficient than OLS. The Durbin-Wu-Hausman test rejects the null hypothesis that the public firm dummy is exogenous at 1% (p-value of nearly zero) and confirm that the public dummy is in fact endogenous.[15]

We also use Heckman's (1979) two-stage method to control for bias due to self-selection of firms that choose to be publicly listed. The result in column 3 of Table 7 shows the public firm dummy that is negative and statistically significant at 1%; after correction for selection bias, the value of coefficient at 0.148 in absolute value is higher than that in Table 5. The coefficient of lambda itself, the correction for selection bias, is positive and significant at 1%.[16]

[14] In unreported analysis, we also repeat the second stage regression for other definitions of profitability and find that the coefficients for the predicted Public dummy are -0.084, -0.138, and -0.189 for ROA net income, ROE EBIT, and ROE net income, respectively.

[15] We follow the methodology by Gourieroux, Monfort, Renault and Trognon (1987) to calculate the test statistics for Durbin-Wu-Hausman test. First, we run the probit model in the first column of Table 7 and save the predicted values (p_hat). Then, we calculate generalized residuals using the formula: $\tilde{u}_i(\theta) = \left[\frac{p.d.f(x_i\theta)}{[c.d.f(x_i\theta)][1-c.d.f(x_i\theta)]}\right][y_i - c.d.f(x_i\theta)]$, where p.d.f and c.d.f are the probability distribution function and cumulative distribution function of N(0,1). Finally, we add this generalized residual to the second stage regression and test for its significance.

[16] We follow Campa and Kedia (2002) to calculate sample-correction variable lambda. $Cash_{it} = \propto_0 + \propto_1 X_{it} + \propto_2 Public_{it} + \propto_\lambda \lambda + \varepsilon_{it}, where\ \lambda = \lambda_1(\beta Z_{it}) = \frac{\phi(\beta Z_{it})}{\Phi(\beta Z_{it})}\ when\ Public_{it} = 1\ and\ \lambda = \lambda_1(\beta Z_{it}) = \frac{-\phi(\beta Z_{it})}{1-\Phi(\beta Z_{it})}\ when\ Public_{it} = 0. \phi(.)\ and$

Thus, compared to our baseline estimation in Table 5, the correction for selection bias by Heckman two-stage method actually strengthens our main finding that profitability is higher for private firms than public firms.

IIId. Propensity score matching

To further allay any sample selection concerns, we also match firms based on propensity scores. Figure 3 provides a histogram of the propensity scores for the unmatched full sample and a propensity score matched sample based on the nearest neighbor with replacement. Propensity scores come from a probit model, where dependent variable is the zero-one *Public* firm dummy. Explanatory variables included are Ln(Total assets), sales growth, Ln(Firm age), industry dummy, year dummy, and constant.[17] In contrast to large differences in propensity scores between private and public firms in the unmatched full sample (Panel A), their propensity scores in the propensity score-matched sample are far more comparable (Panel B). Since we match with replacement, the matched sample has 4,184 private firm-year observations (3,480 distinct private firms) and 4,184 public firm-year observations (704 distinct public firms). Table 8 presents mean differences in various definitions of operating profitability between public firms and propensity score-matched private firms. An average private firm is from 4%-5.1% more profitable than public firms in ROA and 15.7%-17.8% more profitable in ROE. These results confirm our baseline findings in Table 5 that private firms are on average more profitable than public firms: we are keeping the industry-size matching in the basic empirical section because of loss of observations due to additional data requirement and because the results are virtually identical.

[Insert Figure 3 and Table 8 about here]

IIIe. Median Regressions

The multivariate regression analysis discussed above was about the mean differences of performance of public vs. private firms. To address the median differences as another measure of relative performance, we now estimate baseline profitability model (Table 5) by median regression using least absolute deviation method for the unmatched full sample. One advantage of this method is that coefficient estimates are not affected by extreme values at each tail.[18] Estimation results in Table 9 show that the coefficient estimate for the public firm dummy is negative

$\Phi(.)$ are the density and cumulative distribution functions of the standard normal, respectively. Z is a vector of controls. Predicted values from first stage probit are used to calculate sample-correction variables λ_1 and λ_2. In the second stage, we estimate the cash model as specified above, including λ as sample-correction variable.

[17] We also computed propensity scores using an extensive model, which includes Ln(Asset turnover), market share, firm risk, leverage, Ln(Unit employee cost), and Ln(Number of branches) as additional explanatory variables in the first stage, The matched sample based on this probit model has 2,809 private firm-year observations and 2,809 public firm-year observations. Private firms are still on average 4.4% to 15.5% more profitable than comparable public firms, depending on whether ROA or ROE are used.

[18] Noe that we already winsorized each variable at 2.5% at each tail to reduce the effect of outliers, so median regressions by least absolute deviation method would serve as additional robustness.

and statistically significant across all specifications. The median profitability is 0.6% (for ROA EBIT) to 5.1% (for ROE net income) higher for private firms compared to public firms. This result supports our earlier least squares method findings for the means and again serves to confirm that private firms are more profitable than public firms.

[Insert Table 9 about here]

IIIf. Changes in Ownership Status

An additional issue is that firms' ownership status may have been changed due to IPOs or delisting. To address this concern, we first focus on a sample of 325 firms that conducted an IPO during our sample period of 2003-2012. These firms effectively experienced a transition in ownership from private to public and Figure 4 presents the mean (Panel A) and median (Panel B) operating profitability for this restricted sample. We define time zero as the year of the IPO, time t-1 a year before IPO, and so forth. We see that both mean and median profitability before IPO (i.e., when firm is private) is higher compared to years after IPO (i.e., when firm is public). This is consistent with the findings in the IPO literature (e.g., Jain and Kini,1994; Pagano, Panetta and Zingales, 1998; Pastor, Taylor and Veronesi, 2009) and further supports our main finding that private firms perform better than public firms.

[Insert Figure 4 about here]

In Table 10, we examine the performance difference between public and private firms for two subsamples of firms: firms that underwent changes in ownership status due to IPOs or deletions during 2003-2012 and firms without any changes in ownership status. Our basic result that private firms have higher profitability than public firms remains true in both subsamples. However, it is interesting to note that the performance difference between private and public firms is higher for firms that did not change their ownership status compared to firms that did. Apparently, the cost of ownership change is more adverse for public than private firms.

[Insert Table 10 about here]

IV. Channnels of Influence for Relative Firm Performance

Having established a stylized fact that unlisted private firms perform better than listed pubic firms under a variety of different model and data assumptions, we now examine three channels through with superior performance of private firms can come about, and a "counter" channel that favors public firms. We first summarize channels most of which were discussed thus far and examine their viability empirically.

IVa. A Summary of Channels

As discussed above, we identify the following three channels that provide performance advantages to private firms over public ones and test their empirical viability: (1) operational efficiency due to managerial flexibility, (2) higher

level and value of R&D due to long time horizon, and (3) lower agency cost due to controlled ownership. We consider two "counter" channels that may favor public firms over private ones: (1) liquidity or financial resources due to access to public capital market, and (2) reputation advantages of public firms.

Channel 1 (Operational efficiency) – Private firms are more efficient operationally than public firms due to managerial flexibility.

Factors that affect profitability manifest itself in a range of metrics that capture various dimensions of the business. For example, managerial flexibility of private firms suggests that private firms may have freedom in pushing for higher operational efficiency and productivity over time than public firms in terms of asset turnover, collection of receivables and labor productivity.

Channel 2 (R&D) – Private firms have a higher R&D intensity than public firms due to longer time horizon.

Free from pressures to produce quarterly earnings and other market scrutiny, the management of private firms arguably may have a longer time horizon than public firms, leading to more commitments to R&D and other long-term projects. Then it is plausible that private firms invest more and are more responsive to changes in investment opportunities compared to comparable public firms. The difference in investment between public and private firms is more apparent in industries where stock prices are particularly sensitive to current earnings, suggesting that public firms may suffer from managerial myopia (e.g., Asker, Farre-Mensa, Ljungqvist, 2014). In addition, the internalization theory (Buckley and Casson, 1976) suggests that the value of R&D accrued internally may be greater than its value in the markets. This implies that the R&D can bring in more valuation for private firms than public firms.

Channels 3 (Ownership control) – Private firms have lower agency cost than public firms due to ownership control.

As a rule, private firms would higher level of ownership controls, which lowers agency cost (Jensen and Meckling (1976)) and increases firm performance ceteris paribus. In emerging market countries with inadequate institutional development, private expropriation by corporate insiders is possible (Shleifer and Vishny (1997)). However, in Anglo-Saxon countries such as U.K. or U.S. with well-developed governance and institutional infrastructure, such possibility would be less of an issue.

We now consider a "counter" channel that gives advantages to public firms over private firms, The overall performance effect of these counter channels as opposed to three channels above that favor private firms should be determined empirically. Identification of these channels, however, help us focus on the role of different ways that influence the relative performance of private vs. public firms.

Counter-Channel (Liquidity or financial resources) – Public firms are less constrained financially than private firms due to access to public capital markets.

We expect public firms to be more liquid or have more financial resources than private firms because of access to public capital markets. The acquisition of same level of financial resources is generally not possible for unlisted private firms due to limited access to public capital markets, or inimitable in the sense of resource dependency theory (Pfeffer and Salancik (1978)).

IVb. Channel 1: Operational efficiency

Empirical investigation of Channel 1 is conducted in two steps. First, the relative efficiency of public and private firms is estimated by the following operational efficiency model. Second, the predicted efficiency output for fixed asset tunover from this estimation rather than actual values is then used in the baseline profitability model of Table 5. This two-step approach addresses potential concerns relating to simultaneity between fixed asset turnover and profitability.

$$Log(Efficiency_{it}) = \beta_0 + \beta_1 Public_i + \beta_2 Ln(Total\ assets)_{i(t-1)} + \beta_4 Ln(Capital\ intensity)_{i(t-1)} \quad (3)$$

$$+ B_5\ (Market\ share)_{i(t-1)} + \beta_6\ (Sales\ growth)_{i(t-1)} + \beta_7\ Ln(Firm\ age)_{it}$$

$$+ \beta_8\ (Firm\ risk)_{it} + \beta_9\ (Leverage)_{i(t-1)} + industry\ dummies + year\ dummies + \varepsilon_{it}$$

where log(*Efficiency)* is the natural logarithm of an accounting-based measure of operational efficiency such as tangible fixed asset turnover, inventory turnover, collection period, and credit period. This is a baseline model for operational efficiency. An additional independent variable beyond Table 5 is *Ln(Capital intensity)*, which is the natural logarithm of firm's capital stock over total employment. The estimation results in Table 11 confirm the earlier univariate finding that private firms on average are more operationally efficient than public firms. The public firm dummy is negative and significant for fixed asset and inventory turnovers in both unmatched and matched samples, implying that an average private firms are more efficient in turning over their fixed assets or inventory. For asset turnover, the estimated coefficient for the public firm dummy is -0.312 for unmatched sample (and -0.179 for the matched sample), which means that the average tangible fixed asset turnover is 26.8% (16.4%) higher for private firms than public firms.[19] Moreover, the public firm dummy is positive and highly significant for collection period and credit period regressions, meaning that it takes less time for an average private firm to collect its accounts or pay its

[19] Given natural log specification, $26.8\% = e^{-0.312} - 1$, and $16.4\% = e^{-0.179} - 1$. Similar adjustment is applied for economic interpretations of other coefficients of log variables as well.

suppliers, compared to an average public firm. In other words, in unmatched (matched) sample, it takes 31.1% (43.3%) less time for an average private firm to collect its credit account and 37.1% (41.1%) more time to pay its suppliers than an average public firm, again pointing to the relative operational efficiency of private vs. public firms.

[Insert Table 11 about here]

Panel B of Table 11 uses the predicted values of fixed asset turnover ratios from Panel A and re-estimates four variants of ROA and ROE equations of the baseline profitability models in Table 5. We replace the actual fixed asset turnover ratios by their predicted values from the panel of unmatched and matched sample in Panel A. We find that the public firm dummy is still negative and statistically significant at 1%, underscoring our basic hypothesis that private firms are relatively more profitable. We attribute this to managerial flexibility of private firms vs. public firms.

IVc. Channel 2: R&D

To test channel 2 that the superior performance of private firms relative to public firms is due to higher R&D intensity stemming from longer time horizon of private firms' management, we estimate the following empirical model:

$$Profitability_{it} = \beta_0 + \beta_1 Public_i + \beta_2 (R\&D)_{it} + \beta_3 (R\&D)*Public_{it} \quad (4)$$

$$+ \beta_4 Ln(Total\ assets)_{it} + \beta_5 Ln(Asset\ turnover)_{it} + \beta_6 (Market\ share)_{it} + \beta_7 (Sales\ growth)_{it}$$

$$+ \beta_8 Ln(Firm\ age)_{it} + \beta_9 (Firm\ risk)_{it} + \beta_{10} (Leverage)_{it} + \beta_{11} Ln(Unit\ employee\ cost)_{it}$$

$$+ \beta_{12} Ln(Number\ of\ branches)_{it} + industry\ dummies + year\ dummies + \varepsilon_{it}$$

The results for this model are summarized in Table 12, using a R&D flow measure (current R&D expenditures scaled by total assets) in Panel A, and a R&D stock (sum of R&D expenditures in the past 3 years, scaled by total assets) as well as total intangible assets scaled by total assets in Panel B. In both Panel A and B, the R&D variables are statistically insignificant. However, a variable of interest here is the interactive term between R&D and public firm dummy as we are focusing on R&D as a moderating variable that may influence the relative performance of private vs. public firms. In fact, in both Panels A and B, the interaction term, R&D*Public, is negative and statistically significant, suggesting that the reduction in contemporaneous profitability due to R&D expenditure is less for private firms than it is for public firms. Asker, et al. (2014) show that private firms invest more long-term investments relative to total assets than public firms in U.S. due to their longer term orientation. Applied to multinational corporate network, the internalization theory (Buckley and Casson, 1976) suggests that the value of R&D accrued internally may be greater than its value in the markets; if so, the informational value of R&D is higher for private firms than

public firms. The present results are consistent with both of these theories, suggesting the role of R&D as a moderator of influencing relative firm performance.[20]

Eberhart, Maxwell, and Siddique (2004) examine firms which unexpectedly increased their R&D spending, that is, R&D is a shock. The results show positive abnormal operating performance. In Panel C, we investigate whether economically significant increases in R&D affect future operating performance differently for public vs. private firms. Following their (whose?) work, we construct a subsample of firm data in which we only retain firm-year observations when the R&D to assets and R&D to sales are at least 5 % (i.e., R&D is a significant expense) and the increase in the R&D to asset ratio from prior year is at least 5 % (i.e. R&D increase is significant). The results show that the average ROA or ROE for private firms is higher than that of public firms a year after following R&D increase for the subsample of firms with "significant" R&D increases (i.e., at least 5% of total assets). Moreover, the average profitability remains higher for private firms two years after a significant R&D increase. This finding again supports Channel 2 that R&D is an intermediary that produces higher earnings performance of private firms relative to public firms.

[Insert Table 12 about here]

IVd. Channel 3: Ownership control

In this section, we investigate the role of controlling vs. dispersed ownership structure on private vs. public firm profitability. As Figure 5 shows, most private firms in fact have a controlling ownership structure while most public firms have dispersed ownership structure in our U.K. firm sample. In 81.54% of private firm-year observations, there is a known controlling owner, holding more than 50% of the shares, whereas only 9.83% of public-firm year observations have a known controlling owner. On the other hand, only 3.63% of private firm-year observations is characterized by dispersed ownership (no owner has more than 25% of the shares), whereas 67.76% of the public firm-year observations are characterized by dispersed ownership. If we accept a notion that ownership concentration *ceteris paribus* implies a lower agency cost including costs of conflict resolution (Jensen and Meckling (1976)), as well as the saving of listing fees and disclosure of strategic information (Farre-Mensa (2014)), this may give private firms an important advantage, leading to better performance of private firms relative to public firms.

[Insert Figure 5 about here]

To control for sample selection concerns on ownership, we split the sample into three categories: (a) firms in which no shareholder owns more than 25% of the shares; (b) firms in which there is at least one shareholder with more than 25% of the shares but no shareholder with more than 50% ownership; and, (c) firms in which there is an

[20] We also included intangibles and interaction with public firm dummy instead of R&D. The results are somewhat weaker than the ones with R&D but are consistent with our main results.

identifiable shareholder holding more than 50% of the shares. This classification allows us to control for the effect of ownership differences among public and private firms. In Table 13, we present mean differences of various definitions of profitability between public and private firms by ownership category. In each of the ownership categories, we still find that private firms are more profitable than public firms for all four definitions of earnings performance. The differences are more notable in controlling ownership sample (i.e., when both public and private firms have a controlling owner) than it is in dispersed ownership sample (i.e., when no shareholder owns more than 25% of total shares).

[Insert Table 13 about here]

IVe. Counter-Channel: Liquidity and financial resources

Pagano, Panetta and Zingales (1998) and Saunders and Steffen (2011) suggest that public firms may have greater access to capital markets in general and to equity market in particular. To investigate the link between financial resources due to capital market access and profitability, we estimate the following empirical model where financial constraint and its interaction with public firm dummy is added to the baseline profitability model in Table 5:

$$Profitability_{it} = \beta_0 + \beta_1 Public_i + \beta_2 Constrained_{it} + \beta_3 Public_i * FinancialConstraint_{it} \quad (5)$$

$$+ \beta_4 Ln(Total\ assets)_{it} + \beta_5 Ln(Asset\ turnover)_{it} + \beta_6 (Market\ share)_{it} + \beta_7 (Sales\ growth)_{it}$$

$$+ \beta_8 Ln(Firm\ age)_{it} + \beta_9 (Firm\ risk)_{it} + \beta_{10} (Leverage)_{it} + \beta_{11} Ln(Unit\ employee\ cost)_{it}$$

$$+ \beta_{12} Ln(Number\ of\ branches)_{it} + industry\ dummies + year\ dummies + \varepsilon_{it}$$

Constrained is a dummy variable that takes the value of one if a firm is financially constrained and zero otherwise. We use SA (size-age) index proposed by Hadlock and Pierce (2010) to classify a firm as financially constrained or unconstrained. We could not use the Kaplan and Zingales (1997) measure of financial constraint due to the unavailability of market price data for private firms. Specifically, the SA index is calculated as (-0.737*(Firm size)) + (0.043*(Firm size)^2) – (0.040*(Firm age)), where firm size is log of inflation-adjusted (to 2012) book assets, and *Firm age* is number of years since incorporation. The SA index is calculated for each firm at the beginning of the year and is used to place firms with index values in the top (bottom) tercile within the year cohort in the constrained or unconstrained category.[21] This classification system means that, in unmatched raw firm sample, 70.84% or all public

[21] Firm size is winsorized at 2.5% at the bottom and 2.85billion British Pound at the top. (Hadlock and Pierce winsorize size at 4.5billion 2004-constant US dollars at the top.). We convert $4.5billion into 2012 British Pound (equals 2.92billion) by using the historical exchange rate and CPI. Age is winsorized at 37 years at the top.

firm-year observations in the sample or 32.52% of all private firm observations are classified as unconstrained; 10.53% of public firms or 33.83% of private firms are constrained; and 18.63% of public firms or 33.65% of private firms are neither financially constrained or unconstrained. In the size-industry matched firm sample, however, the breakdowns of public and private firm observations are more comparable for each category: 69.63% of public firms or 73.56% of private firms are unconstrained, 10.93% of public firms or 9.44% of private firms are constrained, and 19.44% or publics or 17.00% of privates are classified neither constrained nor unconstrained.

Table 14 presents the estimation results for equation (5) and the public firm dummy is found to be negative and statistically significant in six out of eight models. We interpret this as further evidence in support of our finding that private firms are on average more profitable than public firms. The financial constraint dummy is positive and significant for all regressions in both unmatched and matched samples, meaning that financially constrained firms (both Public and Private) are more profitable than unconstrained firms in terms of profitability ratios. One argument is that the positive coefficient may reflect the fact that financially constrained firms tend to be smaller and younger firms (in the raw sample), which may also be more profitable firms. Another argument is that financially constrained firms are forced to consider only high positive NPV projects than they may otherwise do, which leads to higher profitability ratios, although their aggregate profits would be much lower. The negative and significant coefficient for the interaction variable between financial constraint and public firm dummy implies that the average profitability is even lower for constrained public firms than constrained private firms. All in all, our main finding that private firms perform better than public firms holds even when we consider financial constraint.

[Insert Table 14 about here]

V. Conclusion

Almost the entirety of empirical finance research has been about publicly listed firms. Although private firms are predominant both in numbers and their role in an economy (e.g., jobs, assets), a lack of data has traditionally hampered investigative efforts. With the recent introduction of private firm databases, there is a burgeoning literature of private vs. public firms regarding a specific corporate finance issue such as dividend or investment policy. Still the basic underlying question of how (and why) private firms perform relative to comparable public firms remains an open issue. In this paper, we fill this gap and present a comprehensive analysis of private and public UK firms using a rich dataset from ORBIS covering the period 2003-2012. Specifically, we establish a stylized fact that private firms outperform public firms under various model and data assumptions. We then investigate three channels through which this result favoring private firms may come about – operational efficiency, R&D investments, and ownership controls, as well as a "counter" channel that favors public firms – financial resources due to market access. First, we show that private firms perform better than public firms due to greater operational efficiency stemming from

managerial flexibility. Second, we show that the superior performance of private vs. public firms is due to higher R&D investment due to longer time horizon. Third, we report that an increase in controlling ownership *ceteris paribus* increases firm performance, and more so for private firms than public firms. Regarding the two "counter"-channels, we find that average operating profitability of public firms is even lower than that of private firms when both types of firms are financially constrained. Finally, our stylized fact remains unchanged when we consider the effect of corporate reputation and visibility which favor public firms.

References

Adams, R., Almeida, H., Ferreira, D., 2009. Understanding the relationship between founder CEOs and firm performance. *Journal of Empirical Finance* 16, 136-150.

Adams, R.B., Almeida, H., Ferreira, D., 2005. Powerful CEOs and their impact on corporate performance. *Review of Financial Studies* 18, 1403-1432.

Adams, R.B., Ferreira, D., 2009. Women in the boardroom and their impact on governance and performance. *Journal of Financial Economics* 94, 291-309.

Admati, A R., Pfleiderer, P., 2009. The "Wall Street Walk" and shareholder activism: Exit as a form of voice. *Review of Financial Studies* 22, 2645-2685.

Agrawal, A., Jaffe, J.F., Mandelker, G.N., 1992. The post-merger performance of acquiring firms – a reexamination of an anomaly. *Journal of Finance* 47, 1605-1621.

Akguc, S., Choi, J., 2014. Cash holdings of public and private firms: Evidence from Europe, Temple University Working Paper.

Allee, K., Badertscher, B. and Yohn. T., 2013. Private versus public corporate ownership: Implications for future profitability. Working Paper.

Anderson, R. C. and Reeb, D. M., 2003. Fouding-family ownership and firm performance: Evidence from the S&P 500, *Journal of Finance* 58, 1301-1327.

Asker, J. W, Farre-Mensa, J., Ljungqvist, A., 2014. Comparing the investment behavior of public and private firms. *Review of Financial Studies*, forthcoming.

Badertscher, B., Shroff, N., White, H. D., 2013. Externalities of public firm presence: Evidence from private firms' investment decisions. *Journal of Financial Economics* 109, 682-706.

Ball, R. and Shivakumar, L., 2005. Earnings quality in UK private firms – comparative loss recognition timeliness. Journal of Accounting & Economics 39, 83-128.

Bebchuk, L., Cohen, A., Ferrell, A., 2009. What matters in corporate governance? Review of Financial Studies 22, 783-827

Bekaert, G., Harvey, C., Lundblad, C., Siegel, S., 2013. The European Union, the Euro, and equity market integration. *Journal of Financial Economics* 109, 583-603.

Bhagat, S., Bolton, B., 2013. Director ownership, governance, and performance. *Journal of Financial and Quantitative Analysis* 48, 105-135.

Bhide, A., 1993. The hidden costs of stock market liquidity. *Journal of Financial Economics* 34, 31-51.

Billett, M. T., Xue, H., 2007. The takeover deterrent effect of open market share repurchases. *Journal of Finance* 62, 1827-1850.

Brav, Omer, 2009. Access to capital, capital structure, and the funding of the firm, *Journal of Finance* 64, 263-208.

Brau, J. C., Fawcett, S. E., 2006. Initial public offerings: An analysis of theory and practice. *Journal of Finance* 59, 399-436.

Buckley, P. J., 2009. The internalization theory of multinational enterprise: A review of the progress of a research agenda after 30 years. *Journal of International Business Studies* 40, 1563-1580.

Dennis, D.K., McConnell, J.J., 1986. Corporate mergers and security returns. *Journal of Financial Economics* 16, 143-187.

Faccio, M., McConnell, J.J., Stolin, D., 2006. Returns to acquirers of listed and unlisted targets. *Journal of Financial and Quantitative Analysis* 41, 197-220.

Farre-Mensa, J., 2014. Why are most firms privately held? New York University and Harvard Business School, Working Paper.

Gao, H., Lemmon, M., Li, K. 2013. Shareholder monitoring and CEO pay-performance sensitivity: New evidence from privately-held firms. Working Paper.

Gao, H., Harford, J., Li, K., 2013. Determinants of corporate cash policy: Insights from private firms. *Journal of Financial Economics* 60, 187–243.

Gao, H., Harford, J., Li, K., 2013. Corporate governance and CEO turnover: Insights from private firms. Working Paper.

Giroud, X., Mueller, H.M., 2010. Does corporate governance matter in competitive industries? *Journal of Financial Economics* 95, 312-331.

Giroud, X., Mueller, H.M., 2011. Corporate governance, product market competition, and equity prices. *Journal of Finance* 66, 563-600.

Gourieroux, C., Monfort, A., Renault, E., Trognon. A.,1987. Generalized residuals. *Journal of Econometrics* 34, 5-32.

Graham, J.R., Harvey, C.R., Rajgopal, S., 2005. The economic implications of corporate financial reporting. *Journal of Accounting and Economics* 40, 3-73.

Hadlock, C. J., Pierce, J. R., 2010. New evidence on measuring financial constraints: moving beyond the KZ index. *Review of Financial Studies* 23, 1909-1940.

Healy, P.M., Palepu, K.G., Ruback, R.S., 1992. Does corporate performance improver after mergers?. *Journal of Financial Economics* 31, 135-175

Heckman, James. 1979. Sample selection bias as specification error, Econometrica 47, 153–161.

Hodrick, L. S., 1999. Does stock price elasticity affect corporate financial decisions? *Journal of Financial Economics* 52, 225–256.

Jain, B.A., Kini, O., 1994. The post-issue operating performance of IPO firms. *Journal of Finance* 49, 1699-1726.

Jensen, M., Meckling, W., 1976. Theory of the firm, managerial behavior, agency costs and ownership structure. *Journal of Financial Economics* 4, 305-360.

Kaplan, S., 1989. The effects of management buyouts on operating performance and value. *Journal of Financial Economics* 24, 217-254.

Kaplan, S., Zingales, L., 1997. Do investment-cash flow sensitivities provide useful measures of financing constraints. *Quarterly Journal of Economics* 112, 169-215.

Ke, B., Petroni, K., Safieddine, A., 1999. Ownership concentration and sensitivity of executive pay to accounting performance measures: Evidence from publicly and privately-held insurance companies. *Journal of Accounting and Economics* 28, 185-209.

Lamont, O., Polk, C., Saa-Requejo, J., 2001. Financial constraints and stock returns. *Review of Financial Studies* 14, 529-554.

Maksimovic, V., Phillips, G., Yang, L. 2013. Private and public merger waves. *Journal of Finance* 68, 2177-2217.

Michaely, R., Roberts, M. R. , 2011. Corporate dividend policies: Lessons from private firms, *Review of Financial Studies* 25, 711-746.

Moeller, S.B., Schlingemann, F.P., Stulz, R.M., 2005. Wealth destruction on a massive scale? A study of acquiring-firm returns in the recent merger wave. *Journal of Finance* 60, 757-782.

Pagano, M., Panetta, F., Zingales, L., 1998. Why do companies go public? An empirical analysis. *Journal of Finance* 53, 27-64.

Pastor, L., Taylor, L.A., Veronesi, P., 2009. Entrepreneurial learning, the IPO decision, and the post-IPO drop in firm profitability. *Review of Financial Studies* 22, 3005-3046.

Pfeffer, J. and Salancik, G. R., 1978. The External Control of Organization: A Resource Dependence Perspective, New York: Harper and Row.

Pinkowitz, L., Stulz, R., Williamson, R., 2013. Is there a US high cash holdings puzzle after the financial crisis? Ohio State University Fisher College of Business Working Paper.

Saunders, A. and Steffen, S., 2011. The costs of being private: Evidence from the loan market, *Review of Financial Studies* 24, 4091-4122.

Shleifer, A. and Vishny, R., 1997. A survey of corporate governance, *Journal of Finance* 52, 737-783.

Table 1:Distribution of Sample Firms by Industry

This table presents the distribution of public and private firms in the U.K. for 2003-2012 using Fama-French industry classifications. Source: Bureau van Dijk's Orbis database.

Fama and French industry classification	Public firms	%	Private firms	%	Total	%
1 Agriculture	69	0.022%	4,558	1.428%	4,627	1.450%
2 Food products	103	0.032%	6,519	2.043%	6,622	2.075%
3 Candy and soda	39	0.012%	603	0.189%	642	0.201%
4 Beer & liquor	80	0.025%	918	0.288%	998	0.313%
5 Tobacco products	90	0.028%	20	0.006%	110	0.034%
6 Recreation	39	0.012%	601	0.188%	640	0.201%
7 Entertainment	152	0.048%	7,074	2.217%	7,226	2.265%
8 Printing and publishing	171	0.054%	4,873	1.527%	5,044	1.581%
9 Consumer goods	146	0.046%	3,025	0.948%	3,171	0.994%
10 Apparel	105	0.033%	1,339	0.420%	1,444	0.453%
11 Healthcare	66	0.021%	4,460	1.398%	4,526	1.418%
12 Medical equipment	76	0.024%	1,043	0.327%	1,119	0.351%
13 Pharmaceutical products	163	0.051%	1,484	0.465%	1,647	0.516%
14 Chemicals	163	0.051%	3,985	1.249%	4,148	1.300%
15 Rubber and plastic products	107	0.034%	3,683	1.154%	3,790	1.188%
16 Textiles	35	0.011%	1,722	0.540%	1,757	0.551%
17 Construction materials	174	0.055%	12,246	3.838%	12,420	3.892%
18 Construction	285	0.089%	36,756	11.519%	37,041	11.608%
19 Steel works, etc.	49	0.015%	2,218	0.695%	2,267	0.710%
20 Fabricated products	0	0.000%	478	0.150%	478	0.150%
21 Machinery	181	0.057%	7,095	2.223%	7,276	2.280%
22 Electrical equipment	44	0.014%	1,277	0.400%	1,321	0.414%
23 Automobiles and trucks	73	0.023%	3,861	1.210%	3,934	1.233%
24 Aircraft	30	0.009%	481	0.151%	511	0.160%
25 Shipbuilding, railroad equipment	0	0.000%	292	0.092%	292	0.092%
26 Defense	0	0.000%	98	0.031%	98	0.031%
27 Precious metals	153	0.048%	109	0.034%	262	0.082%
28 Non-metallic and ind. metal mining	159	0.050%	1,182	0.370%	1,341	0.420%
29 Coal	48	0.015%	105	0.033%	153	0.048%
30 Petroleum and natural Gas	289	0.091%	3,295	1.033%	3,584	1.123%
32 Communication	311	0.097%	3,768	1.181%	4,079	1.278%
33 Personal services	94	0.029%	16,148	5.061%	16,242	5.090%
34 Business services	1,673	0.524%	61,897	19.398%	63,570	19.922%
35 Computers	81	0.025%	841	0.264%	922	0.289%
36 Electronic equipment	354	0.111%	3,801	1.191%	4,155	1.302%
37 Measuring and control equipment	70	0.022%	184	0.058%	254	0.080%
38 Business supplies	83	0.026%	2,061	0.646%	2,144	0.672%
39 Shipping containers	30	0.009%	1,873	0.587%	1,903	0.596%
40 Transportation	191	0.060%	17,413	5.457%	17,604	5.517%
41Wholesale	307	0.096%	54,645	17.125%	54,952	17.221%
42 Retail	288	0.090%	13,797	4.324%	14,085	4.414%
43 Restaurants, hotels, motels	174	0.055%	9,037	2.832%	9,211	2.887%
48 Other	85	0.027%	11,511	3.607%	11,596	3.634%
All industries (N)	6,740	2.112%	312,356	97.888%	319,096	100%

Table 2: Descriptive Statistics on Firm Characteristics

This table presents descriptive statistics for raw sample of public and private firms in U.K. from 2003 to 2012 obtained from Bureau van Dijk's Orbis database. See Appendix A for detailed variable descriptions. All monetary values are expressed in 2012 constant price, in million British pound. All continuous variables are winsorized at 2.5% at each tail to reduce the impact of outliers. ***, **, * represent significance at 1%, 5% and 10% levels, respectively.

Panel A: Descriptive statistics – raw sample

?what is asset intensity? Is this in the variable definition? ?make sure all variables are exact throught out the paper?

	Public firms				Private firms					
	N	mean	median	sd	N	mean	median	sd	Difference in means	Difference in medians
Total assets	6433	919.4	81.4	2,345.6	312189	36.6	8.2	84.8	882.8***	73.2***
Revenue	6377	871.5	78.2	2,248.9	249853	44.5	15.3	81.6	827.0***	62.9***
Fixed asset	6433	0.523	0.535	0.241	312189	0.279	0.189	0.274	0.245***	0.346***
Intangible asset	6418	0.227	0.151	0.226	285046	0.027	0.000	0.077	0.201***	0.151***
Tangible fixed asset	6420	0.227	0.142	0.231	291267	0.229	0.131	0.247	-0.002	0.011***
Current asset	6433	0.477	0.465	0.241	312189	0.721	0.811	0.274	-0.245***	-0.346***
Inventory	6429	0.086	0.036	0.106	303906	0.138	0.065	0.173	-0.052***	-0.029***
Accounts receivable	6433	0.153	0.132	0.125	308492	0.197	0.150	0.198	-0.044***	-0.018***
Cash and equivalents	6326	0.150	0.095	0.160	283431	0.140	0.069	0.172	0.010***	0.026***
Cash flow	6361	0.066	0.083	0.125	251227	0.096	0.081	0.094	-0.030***	0.002**
Accounts payable	6433	0.102	0.076	0.088	305236	0.132	0.079	0.148	-0.030***	-0.003*
Short-term debt	6422	0.043	0.013	0.071	302910	0.160	0.075	0.206	-0.117***	-0.062***
Long-term debt	6098	0.113	0.057	0.140	227908	0.107	0.011	0.184	0.006***	0.047***
Total debt	6087	0.157	0.124	0.155	224862	0.250	0.187	0.241	-0.093***	-0.063***
Working capital	6433	0.161	0.128	0.221	312181	0.243	0.207	0.293	-0.082***	-0.079***
Net working capital	6326	0.008	-0.006	0.163	283429	0.091	0.073	0.272	-0.083***	-0.079***
Capital Intensity	6285	0.033	0.006	0.080	241560	0.018	0.001	0.052	0.015***	0.005***
Asset intensity	6325	21.593	6.984	35.062	229223	82.898	12.765	205.648	-61.306***	-5.781***
Market share	6377	0.002	0.000	0.005	249853	0.000	0.000	0.000	0.002***	0.000***
Firm risk	5028	0.306	0.214	0.274	175901	0.224	0.163	0.194	0.081***	0.050***
R&D	2579	0.055	0.020	0.085	6860	0.045	0.017	0.071	0.010***	0.003***
Number of employees	6285	6942	484	28987	241841	353	85	2656	6,588.7***	399.0***
Firm age	6377	31.149	17.000	33.000	312151	24.953	19.000	20.965	6.2***	-2.00***
Number of branches	6433	13.715	1.000	65.502	312189	2.553	0.000	21.906	11.2***	1.00***

Table 2: Descriptive Statistics (Continued)

Panel B: Descriptive statistics – matched sample
?add a sentence about the matching method?

	Public firms				Private firms					
	N	Mean	median	sd	N	mean	median	sd	Difference in means	Difference in medians
Total assets	6455	554.8	70.2	1,297.9	6455	521.4	70.7	1,199.7	33.5	-0.5
Revenue	6389	522.4	64.4	1,213.9	5981	348.3	60.7	816.0	174.1***	3.7
Fixed asset	6455	0.514	0.522	0.244	6455	0.363	0.304	0.302	0.150***	0.218***
Intangible fixed asset	6433	0.227	0.149	0.228	6000	0.057	0.000	0.128	0.170***	0.149***
Tangible fixed asset	6437	0.222	0.134	0.231	6103	0.228	0.126	0.251	-0.006	0.007***
Current asset	6455	0.486	0.478	0.244	6455	0.637	0.696	0.302	-0.150***	-0.218***
Inventory	6451	0.085	0.030	0.106	6299	0.100	0.031	0.140	-0.015***	-0.001***
Accounts receivable	6455	0.157	0.136	0.127	6407	0.142	0.089	0.156	0.015***	0.047***
Cash and equivalents	6338	0.157	0.099	0.167	5740	0.106	0.046	0.143	0.051***	0.054***
Cash flow	6380	0.062	0.081	0.130	5616	0.090	0.076	0.096	-0.028***	0.005***
Accounts payable	6455	0.102	0.076	0.089	6346	0.089	0.049	0.110	0.013***	0.027***
Short-term debt	6444	0.042	0.012	0.072	6320	0.200	0.104	0.234	-0.157***	-0.092***
Long-term debt	6086	0.111	0.050	0.141	5252	0.133	0.013	0.210	-0.022***	0.036***
Total debt	6075	0.154	0.118	0.157	5188	0.315	0.265	0.259	-0.161***	-0.147***
Working capital	6455	0.169	0.134	0.226	6455	0.209	0.179	0.312	-0.040***	-0.045***
Net working capital	6338	0.010	-0.006	0.164	5740	0.099	0.077	0.291	-0.089***	-0.083***
Capital Intensity	6297	0.032	0.006	0.075	5470	0.112	0.002	0.391	-0.080***	0.003***
Asset intensity	6337	22.592	7.363	36.583	5472	49.906	7.973	127.630	-27.314***	-0.609***
Market share	6389	0.0011	0.0001	0.002	5981	0.0008	0.0001	0.002	0.0003***	0.000
Firm risk	4894	0.309	0.215	0.277	4407	0.244	0.168	0.227	0.065***	0.047***
R&D	2474	0.058	0.022	0.087	424	0.033	0.013	0.056	0.025***	0.009***
Number of employees	6297	5164	425	24229	5482	2933	248	13322	2,231.0***	177.5***
Firm age	6403	29.625	16.000	32.293	6451	28.992	21.000	25.858	0.6	-5.00***
Number of branches	6455	13.304	1.000	65.132	6455	14.970	0.000	71.376	-1.7	1.00***

Table 3: Data Correlation Matrix

Panel A: Pairwise correlation matrix – raw sample

	1	2	3	4	5	6	7	8	9
1 Public	1								
2 Ln(Total assets)	0.2245*	1							
3 Ln(Asset tunover)	-0.0587*	-0.2165*	1						
4 Market share	0.3341*	0.3174*	-0.0471*	1					
5 Sales growth	0.0511*	0.0420*	0.0873*	0.0121*	1				
6 Ln(Firm age)	0.0050*	0.1104*	-0.1113*	0.0430*	-0.1434*	1			
7 Firm risk	0.0680*	0.0353*	0.0986*	-0.0258*	0.2336*	-0.2149*	1		
8 Leverage	-0.0624*	0.2910*	-0.2122*	-0.0052*	0.0199*	-0.1360*	0.0839*	1	
9 Ln(Unit employee cost)	0.0117*	0.1199*	0.3359*	-0.0134*	0.0790*	-0.0497*	0.2012*	-0.0868*	1
10 Ln(Number of branches)	0.0990*	0.3057*	-0.0889*	0.1683*	-0.0350*	0.2178*	-0.0953*	0.0357*	-0.1476*

Panel B: Pairwise correlation matrix – matched sample

	1	2	3	4	5	6	7	8	9
1 Public	1								
2 Ln(Total assets)	0.0042	1							
3 Ln(Asset tunover)	-0.0371*	-0.2239*	1						
4 Market share	0.0690*	0.5469*	-0.0817*	1					
5 Sales growth	0.0877*	-0.0426*	0.0246*	-0.0588*	1				
6 Ln(Firm age)	-0.0738*	0.2017*	-0.0629*	0.1473*	-0.2153*	1			
7 Firm risk	0.1265*	-0.1393*	-0.0416*	-0.1690*	0.4193*	-0.3259*	1		
8 Leverage	-0.3568*	0.2803*	-0.1807*	0.0823*	-0.0329*	-0.0332*	-0.0746*	1	
9 Ln(Unit employee cost)	-0.0992*	-0.0288*	0.2755*	-0.1661*	0.0390*	-0.0841*	0.1337*	-0.0348*	1
10 Ln(Number of branches)	0.0353*	0.4197*	-0.1078*	0.3647*	-0.1015*	0.2992*	-0.2185*	0.0875*	-0.2479*

Table 4: Univariate Analysis of Performance of Public vs. Private Firms

?add note on significance level notations?

Panel A: Performance statistics- raw sample

	Public Firms				Private Firms					
	N	mean	median	sd	N	mean	median	sd	Difference in means	Difference in medians
Profitability										
ROA EBITDA	6341	0.091	0.105	0.132	251461	0.112	0.096	0.114	-0.021***	0.009***
ROA EBIT	6404	0.037	0.065	0.151	274589	0.076	0.059	0.112	-0.039***	0.006***
ROA Net income	6428	0.011	0.042	0.149	275351	0.061	0.045	0.092	-0.050***	-0.002***
ROE EBITDA	6340	0.254	0.236	0.360	251269	0.442	0.273	0.659	-0.188***	-0.037***
ROE EBIT	6403	0.111	0.142	0.378	274064	0.288	0.177	0.579	-0.177***	-0.034***
ROE Net income	6427	0.031	0.097	0.375	275155	0.201	0.132	0.401	-0.169***	-0.035***
Cash Flow / Op. revenue	6282	0.023	0.081	0.391	228443	0.080	0.051	0.107	-0.057***	0.029***
Sales-to-equity	6376	3.419	1.984	4.254	249217	11.368	4.453	20.665	-7.949***	-2.469***
Efficiency										
Asset efficiency	5605	21.466	7.241	34.2	196678	76.428	12.907	181.852	-54.962***	-5.666***
Inventory efficiency	4472	34.971	5.831	89.005	148966	59.153	9.454	151.073	-24.182***	-3.623***
Collection period	5480	53.455	51.624	32.913	196950	48.063	46.503	32.775	5.392***	5.121***
Credit period	5574	38.489	29.771	34.296	200708	29.465	24.721	23.129	9.024***	5.051***
Interest coverage	5478	19.235	4.810	53.683	198080	37.750	5.040	92.019	-18.514***	-0.230**
Productivity										
EBIT per employee	6266	0.008	0.007	0.058	241030	0.018	0.006	0.041	-0.009***	0.001***
EBITDA per employee	6230	0.023	0.012	0.068	231511	0.021	0.009	0.038	0.002***	0.003***
Net income per employee	6285	0.002	0.005	0.050	240845	0.015	0.005	0.036	-0.013***	0.000
Revenue per employee	6243	0.190	0.125	0.195	218811	0.377	0.166	0.628	-0.186***	-0.042***
Cost of employee / Op. revenue	6187	0.303	0.256	0.221	220165	0.237	0.197	0.173	0.066***	0.059***
Equity per employee	6285	0.194	0.064	0.413	241840	0.114	0.038	0.236	0.081***	0.027***
Unit employee cost	6227	0.039	0.034	0.023	237905	0.036	0.031	0.020	0.003***	0.003***
Structural										
Liquidity	6426	1.583	1.100	1.508	298417	1.653	1.130	1.768	-0.069***	-0.030**
Current ratio	6433	1.923	1.416	1.616	307492	2.130	1.398	2.263	-0.207***	0.019*
Equity / Asset	6433	0.501	0.495	0.211	312188	0.405	0.376	0.254	0.095***	0.118***
Debt-to-equity	6352	0.692	0.391	0.855	280965	1.098	0.461	1.559	-0.406***	-0.070***
Growth										
Sales growth	5575	0.179	0.082	0.470	202670	0.084	0.047	0.294	0.095***	0.035***
Gross Investment	5683	0.088	0.020	0.230	267571	0.017	0.000	0.087	0.072***	0.020***
Fixed asset growth	5660	0.253	0.046	0.706	250407	0.112	-0.014	0.572	0.140***	0.060***
Employee growth	5520	0.091	0.035	0.277	198852	0.028	0.004	0.159	0.064***	0.031***
Volatility										
Earnings volatility	6430	0.251	0.180	0.210	299678	0.445	0.304	0.452	-0.194***	-0.123***
Cash flow volatility	6420	0.091	0.052	0.103	283085	0.070	0.050	0.063	0.021***	0.001

Panel B: Performance statistics- m*atched sample*

	Public firms				Private firms					
	N	mean	median	sd	N	mean	median	sd	Difference in means	Difference in medians
Profitability										
ROA EBITDA	6360	0.087	0.103	0.135	5626	0.103	0.087	0.111	-0.016***	0.016***
ROA EBIT	6425	0.033	0.063	0.154	6223	0.063	0.048	0.103	-0.030***	0.015***
ROA Net income	6449	0.007	0.041	0.152	6269	0.052	0.038	0.090	-0.045***	0.003**
ROE EBITDA	6359	0.245	0.227	0.366	5617	0.447	0.251	0.749	-0.202***	-0.024***
ROE EBIT	6424	0.104	0.138	0.381	6210	0.266	0.148	0.586	-0.162***	-0.011**
ROE Net income	6448	0.026	0.092	0.375	6265	0.174	0.115	0.393	-0.148***	-0.023***
Cash Flow / Op. revenue	6289	0.008	0.078	0.424	5461	0.109	0.072	0.166	-0.102***	0.005**
Sales-to-equity	6388	3.447	1.979	4.325	5964	8.516	2.918	17.336	-5.069***	-0.939***
Efficiency										
Asset efficiency	5529	22.425	7.648	35.288	4742	46.958	7.954	114.281	-24.534***	-0.306
Inventory efficiency	4355	37.249	6.045	95.643	3334	63.240	8.809	182.545	-25.991***	-2.764***
Collection period	5408	54.183	52.145	33.465	4599	46.406	43.497	34.295	7.776***	8.648***
Credit period	5499	39.005	29.647	36.358	4729	28.255	22.471	24.458	10.750***	7.177***
Interest coverage	5448	19.542	4.710	55.681	4833	27.918	3.570	72.608	-8.377***	1.140***
Productivity										
EBIT per employee	6277	0.004	0.007	0.051	5453	0.050	0.008	0.170	-0.046***	-0.002***
EBITDA per employee	6241	0.017	0.012	0.052	5258	0.052	0.014	0.134	-0.035***	-0.002***
Net income per employee	6296	0.000	0.004	0.048	5451	0.050	0.007	0.162	-0.050***	-0.002***
Revenue per employee	6248	0.179	0.122	0.172	5315	0.591	0.188	1.242	-0.412***	-0.066***
Cost of employee / Op. revenue	6191	0.312	0.261	0.234	5290	0.231	0.192	0.175	0.081***	0.069***
Equity per employee	6297	0.178	0.063	0.356	5482	0.574	0.067	1.907	-0.396***	-0.003**
Unit employee cost	6236	0.038	0.034	0.022	5380	0.043	0.036	0.029	-0.005***	-0.002***
Structural										
Liquidity	6444	1.636	1.130	1.571	6198	2.113	1.180	3.029	-0.477***	-0.050***
Current ratio	6455	1.974	1.434	1.679	6405	2.720	1.436	4.187	-0.746***	-0.002***
Equity / Asset	6455	0.507	0.502	0.213	6455	0.405	0.379	0.263	0.102***	0.124***
Debt-to-equity	6367	0.664	0.362	0.847	5706	1.399	0.693	1.793	-0.735***	-0.331***
Growth										
Sales growth	5495	0.194	0.085	0.499	5059	0.117	0.052	0.355	0.077***	0.033***
Gross Investment	5608	0.092	0.020	0.238	5611	0.030	0.000	0.123	0.062***	0.020***
Fixed asset growth	5586	0.273	0.047	0.755	5306	0.146	-0.002	0.630	0.127***	0.048***
Employee growth	5441	0.098	0.038	0.285	4654	0.040	0.007	0.198	0.058***	0.031***
Volatility										
Earnings volatility	6452	0.258	0.186	0.215	6351	0.356	0.230	0.402	-0.098***	-0.044***
Cash flow volatility	6442	0.094	0.053	0.106	5863	0.075	0.055	0.067	0.019***	-0.002*

Table 5: Baseline Profitability Regressions

This table presents regression of various definitions of profitability on firm characteristics in the U.K. between 2003 and 2012 for raw and industry-size matched samples. The data for publicly traded and private firms comes from *Bureau van Dijk (BvD)'s ORBIS* database. Dependent variable is a measure of ROA or ROE. Public is a dummy variable that takes a value of one if a firm is publicly traded and zero otherwise. Ln(Total assets) is the natural logarithm of book value of assets. Ln(Asset turnover) is the natural logarithm of average tangible fixed asset turnover, calculated as operating revenue divided by average tangible fixed asset. Market share is firm's market share in operating revenue in industry at the 2-digit SIC level. Sales growth is the percentage increase in operating revenue from time t-1 to time t. Firm age is the natural logarithm of years since firm's founding. Firm risk is the standard deviation of sales in the past 5 years over mean of sales in the past 5 years Leverage is total debt over total assets. Unit employee cost is the natural logarithm of total cost of employees divided by total employees. Ln(Number of branches) is the natural logarithm of one plus the number of branches a firm has. The t-statistics reported in parentheses are based on standard errors robust to clustering at the firm level. Industry and year dummies are included in all regressions. ***, **, * represent significance at 1%, 5% and 10% levels, respectively. All continuous variables are winsorized at 2.5% at each tail to reduce the impact of outliers (except leverage, which is winsorized to be between 0 and 1). Monetary values are converted into 2012 constant pounds using the British CPI.

	Raw sample				**Matched sample**			
	ROA EBIT	ROA NI	ROE EBIT	ROE NI	ROA EBIT	ROA NI	ROE EBIT	ROE NI
Public	-0.044***	-0.056***	-0.127***	-0.149***	-0.023***	-0.040***	-0.067***	-0.103***
	(-10.21)	(-14.45)	(-11.05)	(-15.07)	(-4.99)	(-9.47)	(-4.54)	(-8.34)
Ln(Total assets)	0.002***	0.003***	0.004*	0.009***	0.016***	0.016***	0.033***	0.034***
	(3.20)	(7.74)	(1.76)	(5.97)	(8.16)	(8.70)	(5.49)	(7.00)
Ln(Asset turnover)	0.007***	0.006***	0.044***	0.032***	0.011***	0.008***	0.039***	0.027***
	(20.89)	(20.70)	(26.15)	(29.23)	(6.48)	(5.03)	(7.36)	(6.42)
Market share	4.263***	2.777***	15.911***	9.139***	-3.225***	-3.999***	1.731	-4.743
	(7.54)	(6.58)	(7.17)	(5.57)	(-2.76)	(-3.82)	(0.38)	(-1.39)
Sales growth	0.078***	0.055***	0.288***	0.206***	0.052***	0.045***	0.123***	0.111***
	(45.74)	(36.96)	(41.86)	(39.32)	(8.15)	(6.74)	(6.93)	(6.09)
Ln(Firm age)	-0.007***	-0.001**	-0.045***	-0.011***	0.004	0.006**	0.005	0.015**
	(-9.79)	(-2.50)	(-13.92)	(-4.96)	(1.51)	(2.47)	(0.65)	(2.19)
Firm risk	-0.038***	-0.021***	-0.112***	-0.073***	-0.127***	-0.110***	-0.258***	-0.225***
	(-10.67)	(-7.09)	(-7.65)	(-7.14)	(-10.02)	(-8.39)	(-7.72)	(-7.05)
Leverage	-0.092***	-0.099***	0.112***	-0.106***	-0.082***	-0.112***	0.100**	-0.132***
	(-42.41)	(-58.55)	(8.32)	(-12.02)	(-7.32)	(-11.07)	(2.16)	(-3.49)
Ln(Unit employee cost)	-0.005***	0.000	-0.038***	-0.011***	-0.025***	-0.019***	-0.049***	-0.035***
	(-3.97)	(0.20)	(-6.65)	(-2.79)	(-4.89)	(-4.07)	(-3.10)	(-2.85)
Ln(Number of branches)	-0.001**	-0.001	-0.002	0.001	-0.006***	-0.004***	-0.015**	-0.006
	(-2.19)	(-1.29)	(-0.75)	(0.46)	(-3.29)	(-2.69)	(-2.46)	(-1.16)
Industry	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	0.085***	0.065***	0.106***	0.071***	-0.073***	-0.060***	-0.170**	-0.153***
	(13.91)	(13.26)	(4.03)	(3.88)	(-3.03)	(-2.69)	(-2.40)	(-2.61)
N	110090	109992	110043	109970	7554	7557	7549	7555
adj. R^2	0.116	0.130	0.072	0.076	0.145	0.150	0.103	0.112

Table 6: Change in Profitability: Unobservable Firm Characteristics

This table presents regression of changes in firm profitability on changes in firm characteristics in the UK between 2003 and 2012 for raw and industry-size matched samples. The data for publicly traded and private firms comes from *Bureau van Dijk (BvD)'s ORBIS* database. Dependent variable is changes in a measure of ROA or ROE. Δ indicates change from time (t-1) to time (t). Public is a dummy variable that takes a value of one if a firm is publicly traded and zero otherwise. Ln(Total assets) is the natural logarithm of book value of assets. See Appendix A1 for the definition of independent variables. The t-statistics reported in parentheses are based on standard errors robust to clustering at the firm level. Industry and year dummies are included in all regressions. ***, **, * represent significance at 1%, 5% and 10% levels, respectively. All continuous variables are winsorized at 2.5% at each tail to reduce the impact of outliers (except leverage, which is winsorized to be between 0 and 1). Monetary values are converted into 2012 constant pounds using the British CPI.

	Raw sample				**Matched sample**			
	Δ (ROA EBIT)	Δ (ROA NI)	Δ (ROE EBIT)	Δ (ROE NI)	Δ (ROA EBIT)	Δ (ROA NI)	Δ (ROE EBIT)	Δ (ROE NI)
Public	-0.029***	-0.039***	-0.133***	-0.125***	-0.009**	-0.022***	-0.076***	-0.079***
	(-7.73)	(-11.42)	(-12.70)	(-14.37)	(-2.19)	(-6.21)	(-5.40)	(-7.47)
Δ Ln(Total assets)	0.119***	0.114***	0.387***	0.384***	0.181***	0.194***	0.419***	0.475***
	(48.97)	(53.36)	(37.73)	(49.81)	(16.15)	(17.29)	(13.73)	(16.61)
Δ (Asset turnover)	0.027***	0.021***	0.103***	0.072***	0.025***	0.018***	0.075***	0.050***
	(17.54)	(16.70)	(15.03)	(14.72)	(3.70)	(2.74)	(3.59)	(2.67)
Δ (Market share)	63.688***	41.729***	235.795***	151.055***	47.805***	28.643***	185.477***	113.980***
	(10.81)	(9.13)	(10.83)	(9.71)	(6.65)	(4.55)	(7.03)	(5.72)
Δ (Sales growth)	-0.014***	-0.014***	-0.042***	-0.038***	-0.020***	-0.018***	-0.055***	-0.053***
	(-12.49)	(-14.82)	(-8.43)	(-10.81)	(-4.76)	(-4.71)	(-4.18)	(-4.43)
Ln(Firm age)	-0.004***	0.003***	-0.049***	-0.007***	0.008***	0.011***	0.011	0.025***
	(-5.40)	(4.32)	(-15.18)	(-3.24)	(2.81)	(4.55)	(1.31)	(3.72)
Firm risk	-0.031***	-0.022***	-0.033**	-0.045***	-0.131***	-0.119***	-0.286***	-0.255***
	(-8.25)	(-7.28)	(-2.15)	(-4.34)	(-10.92)	(-10.26)	(-8.69)	(-8.68)
Δ (Leverage)	-0.216***	-0.217***	-0.598***	-0.661***	-0.306***	-0.351***	-0.673***	-0.877***
	(-52.79)	(-59.43)	(-29.93)	(-43.39)	(-14.14)	(-15.96)	(-7.84)	(-12.14)
Δ Ln(Unit employee cost)	-0.014***	-0.008***	-0.045***	-0.029***	-0.024**	-0.026**	-0.061*	-0.050
	(-5.69)	(-3.79)	(-4.20)	(-3.71)	(-2.20)	(-2.36)	(-1.75)	(-1.59)
Ln(Number of branches)	-0.002***	-0.001	0.002	0.004**	-0.000	0.001	0.001	0.007
	(-2.76)	(-1.33)	(0.91)	(1.99)	(-0.16)	(0.54)	(0.22)	(1.49)
Industry	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	0.093***	0.044***	0.386***	0.157***	0.060***	0.027***	0.209***	0.069***
	(36.65)	(22.92)	(33.70)	(21.37)	(6.24)	(3.20)	(6.39)	(2.83)
N	99778	99686	99736	99667	7141	7143	7138	7143
adj. R^2	0.111	0.134	0.069	0.098	0.212	0.238	0.131	0.189

Table 7: Instrumental Variable Method and Heckman Sample Selection Model

This table presents 2-stage Least Squares (2SLS) regression and Heckman's (1979) two-stage sample-selection estimation of profitability on firm characteristics for UK between 2003 and 2012. The first-stage regression is Probit, where Public is a dummy variable that takes a value of one if a firm is publicly traded and zero otherwise. Lagged firm-specific variables are included as controls in the first stage probit. The second-stage regression for IV is pooled OLS, with ROA EBIT (EBIT divided by book value of assets) as dependent variable. See Appendix A1 for the definition of independent variables. Distance from London is used as an instrument for endogenous Public dummy and is calculated as log(1+ Google Maps driving distance in miles between the city where firm is located and London). The Null hypothesis for endogeneity test is that Public dummy is exogenous. The t-statistics reported in parentheses are based on standard errors robust to clustering at the firm level. Industry and year dummies are included in all regressions. ***, **, * represent significance at 1%, 5% and 10% levels, respectively. All continuous variables are winsorized at 2.5% at each tail to reduce the impact of outliers (except leverage, which is winsorized to be between 0 and 1). GBP values are converted into 2012 constant values using the British CPI.

	First Stage	**Second Stage – IV**	**Heckman Sample-selection**
	Public	ROA EBIT	ROA EBIT
	(*lagged controls)*	(*contemporaneous controls)*	(*contemporaneous controls)*
Public			-0.148***
			(-5.67)
Public (*predicted*)		-0.074***	
		(-7.23)	
Firm size	0.289***	0.003***	0.003***
	(13.49)	(5.42)	(5.86)
Asset efficiency	-0.070***	0.007***	0.007***
	(-4.62)	(17.45)	(17.44)
Market share	602.945***	5.173***	5.051***
	(10.46)	(7.20)	(7.63)
Sales growth	0.151***	0.079***	0.080***
	(4.65)	(37.32)	(38.65)
Firm age	-0.119***	-0.006***	-0.006***
	(-3.38)	(-7.41)	(-7.50)
Firm risk	1.232***	-0.030***	-0.029***
	(13.80)	(-7.22)	(-6.99)
Leverage	-2.256***	-0.094***	-0.096***
	(-18.70)	(-36.19)	(-36.71)
Unit employee cost	-0.266***	-0.005***	-0.005***
	(-5.24)	(-3.30)	(-3.53)
Number of branches	-0.008	-0.002***	-0.002***
	(-0.32)	(-2.60)	(-2.62)
Distance to London	-0.065***		
	(-4.88)		
Industry dummies	Yes	Yes	
Year dummies	Yes	Yes	
Constant	-1.98***	0.079***	
	(-4.87)	(11.15)	
Lambda			0.069***
			(4.15)
Durbin-Wu-Hausman test		0.000	
(*p-value*)			
N	85676	78162	78162
Pseudo-R^2	0.37		
adj. R^2		0.114	0.118

Table 8: Propensity Score Matching: Difference in Profitability between Public and Private Firms

This table presents average differences in profitability between public and private firms for the UK between 2003 and 2012. The data for public and private firms comes from *Bureau van Dijk (BvD)'s ORBIS* database. The propensity scores used to construct the matched sample come from a probit model where the dependent variable is Public dummy that takes a value of one if a firm is publicly traded and zero otherwise. Control variables include Ln(Total assets), sales growth, Ln(Firm age), and industry and year dummies. The t-statistics reported in parentheses are based on standard errors robust to clustering at the firm level. ***, **, * represent significance at 1%, 5% and 10% levels, respectively. All continuous variables are winsorized at 2.5% at each tail to reduce the impact of outliers (except leverage, which is winsorized to be between 0 and 1). Monetary values are converted into 2012 constant pound using the British CPI.

	ROA EBIT	ROA NI	ROE EBIT	ROE NI
Mean (Public – Private)	-0.040***	-0.051***	-0.178***	-0.157***
	(-14.01)	(-18.91)	(-17.85)	(-19.72)

Table 9: Median Profitability

This table presents median regression of various definitions of profitability on firm characteristics for UK between 2003 and 2012 for raw sample. The data for publicly traded and private firms comes from *Bureau van Dijk (BvD)'s ORBIS* database. Dependent variable is a measure of ROA or ROE. Public is a dummy variable that takes a value of one if a firm is publicly traded and zero otherwise. See Appendix A1 for the definition of independent variables. The t-statistics reported in parentheses are based on standard errors robust to clustering at the firm level. Industry and year dummies are included in all regressions. ***, **, * represent significance at 1%, 5% and 10% levels, respectively. All continuous variables are winsorized at 2.5% at each tail to reduce the impact of outliers (except leverage, which is winsorized to be between 0 and 1). Monetary values are converted into 2012 constant pounds using the British CPI.

	(1) ROA EBIT	(2) ROA NI	(3) ROE EBIT	(4) ROE NI
Public	-0.006***	-0.015***	-0.040***	-0.051***
	(-4.57)	(-14.61)	(-10.54)	(-18.32)
Ln(Total assets)	0.000	0.001***	-0.001	0.003***
	(0.99)	(8.83)	(-0.98)	(6.80)
Ln(Asset turnover)	0.005***	0.004***	0.031***	0.024***
	(26.35)	(29.98)	(63.04)	(66.68)
Market share	2.081***	0.892***	11.883***	5.916***
	(8.33)	(4.75)	(17.40)	(11.80)
Sales growth	0.068***	0.047***	0.236***	0.163***
	(65.74)	(60.01)	(83.29)	(77.81)
Ln(Firm age)	-0.008***	-0.002***	-0.033***	-0.014***
	(-21.03)	(-7.37)	(-32.82)	(-19.27)
Firm risk	-0.022***	-0.010***	-0.023***	-0.003
	(-12.98)	(-7.47)	(-5.00)	(-0.88)
Leverage	-0.063***	-0.073***	0.098***	-0.030***
	(-52.55)	(-79.97)	(30.00)	(-12.21)
Ln(Unit employee cost)	-0.002***	0.003***	-0.013***	0.001
	(-3.19)	(5.78)	(-7.84)	(0.51)
Ln(Number of branches)	0.000	0.000*	0.002**	0.003***
	(0.97)	(1.91)	(2.37)	(4.53)
Industry	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes
Constant	0.080***	0.068***	0.112***	0.101***
	(11.75)	(13.15)	(6.03)	(7.33)
N	110090	109992	110043	109970
pseudo R^2	0.056	0.070	0.055	0.052

Table 10: Changes in Ownership Status

This table presents operating profitability for public and private firms for the UK between 2003 and 2012. We differentiate between firms that are public or private throughout the sample period, and those who did IPO or delisted from stock exchange.

	Firms with no change in ownership status during 2003-2012			Firms that conducted IPO or delisted from stock exchange during 2003-2012		
	Public	Private	Difference	Public	Private	Difference
ROA EBIT	0.045	0.076	-0.031***	0.015	0.035	-0.021***
ROA NI	0.019	0.061	-0.042***	-0.011	0.045	-0.056***
ROE EBIT	0.131	0.289	-0.157***	0.051	0.075	-0.024***
ROE NI	0.051	0.201	-0.150***	-0.023	0.076	-0.098***

Table 11: Operating Efficiency

Panel A: Baseline efficiency regressions

This table presents regression of various definitions of operating efficiency on firm characteristics for UK between 2003 and 2012. The data for publicly traded and private firms comes from *Bureau van Dijk (BvD)'s ORBIS* database. Dependent variable is a measure of operating efficiency expressed in natural logarithm. Public is a dummy variable that takes a value of one if a firm is publicly traded and zero otherwise. Subscript (t-1) indicates the lag value at time t-1. See Appendix A1 for the definition of independent variables. The t-statistics reported in parentheses are based on standard errors robust to clustering at the firm level. Industry and year dummies are included in all regressions. ***, **, * represent significance at 1%, 5% and 10% levels, respectively. All continuous variables are winsorized at 2.5% at each tail to reduce the impact of outliers (except leverage, which is winsorized to be between 0 and 1). Monetary values are converted into 2012 constant pounds using the British CPI.

	Raw sample				**Matched sample**			
	Asset turnover	Inventory turnover	Collection period	Credit period	Asset turnover	Inventory turnover	Collection period	Credit period
Public	-0.312***	-0.451***	0.271***	0.315***	-0.179**	-0.410***	0.360***	0.344***
	(-5.68)	(-7.68)	(8.48)	(11.17)	(-2.24)	(-5.44)	(7.14)	(9.18)
Ln(Total assets) $_{(t-1)}$	-0.118***	0.013	-0.068***	-0.013**	-0.125***	0.032	-0.098***	-0.033***
	(-13.71)	(1.51)	(-11.30)	(-2.48)	(-5.22)	(1.17)	(-6.35)	(-2.65)
Capital intensity $_{(t-1)}$	0.006*	-0.024***	0.001	-0.022***	-0.007	-0.041***	-0.015*	-0.003
	(1.81)	(-7.40)	(0.35)	(-11.11)	(-0.47)	(-2.92)	(-1.70)	(-0.41)
Market share $_{(t-1)}$	69.064***	14.392*	3.162	-0.874	36.228**	-15.123	12.881	10.815**
	(6.96)	(1.92)	(0.57)	(-0.23)	(2.50)	(-1.02)	(1.19)	(2.15)
Sales growth $_{(t-1)}$	0.266***	0.159***	-0.002	-0.038***	0.260***	0.102*	-0.039	-0.140***
	(12.21)	(7.54)	(-0.17)	(-3.09)	(5.24)	(1.65)	(-1.06)	(-3.84)
Leverage $_{(t-1)}$	-0.898***	-0.471***	-0.021	-0.439***	-0.240	-0.276	-0.205**	0.488***
	(-18.28)	(-10.03)	(-0.62)	(-16.04)	(-1.38)	(-1.44)	(-2.04)	(5.43)
Ln(Firm age)	-0.147***	-0.081***	0.022**	-0.019**	-0.932***	-0.359*	0.220*	-0.217**
	(-10.56)	(-5.99)	(2.38)	(-2.42)	(-4.69)	(-1.91)	(1.72)	(-2.26)
Firm risk	0.538***	-0.194***	0.031	0.093**	-0.053	-0.098**	0.057**	0.011
	(8.05)	(-2.86)	(0.71)	(2.54)	(-1.29)	(-2.36)	(2.01)	(0.55)
Industry	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	3.355***	2.718***	3.651***	3.157***	3.059***	2.555***	3.497***	2.981***
	(55.10)	(46.09)	(86.81)	(89.93)	(14.85)	(12.84)	(27.06)	(30.31)
N	97960	77393	95434	97353	7114	5554	6899	7030
adj. R^2	0.259	0.287	0.235	0.114	0.284	0.246	0.295	0.139

Panel B: Baseline profitability regressions with predicted asset turnover

This panel presents baseline profitability regressions in Table 4 using the predicted asset turnover instead of the actual asset turnover. Predicted values come from the first column of Table 9 Panel A. Controls are Ln(Total assets), Ln(Asset turnover), market share, sales growth, Ln(Firm age), firm risk, leverage, Ln(Unit employee cost), and Ln(Number of branches). ***, **, * represent significance at 1%, 5% and 10% levels, respectively. The t-statistics reported in parentheses are based on standard errors robust to clustering at the firm level. All continuous variables are winsorized at 2.5% at each tail to reduce the impact of outliers (except leverage, which is winsorized to be between 0 and 1).

	Raw sample				**Matched sample**			
	ROA EBIT	ROA NI	ROE EBIT	ROE NI	ROA EBIT	ROA NI	ROE EBIT	ROE NI
Public	-0.040***	-0.057***	-0.142***	-0.164***	-0.011**	-0.028***	-0.048***	-0.077***
	(-8.99)	(-14.24)	(-11.71)	(-16.07)	(-2.04)	(-5.45)	(-2.96)	(-5.26)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	90817	90774	90810	90767	6890	6901	6890	6901
adj. R^2	0.105	0.122	0.051	0.058	0.140	0.149	0.094	0.109

Table 12: The Effect of R&D on Profitability

Panel A: Informational value of R&D

This panel presents regression of various definitions of profitability on firm characteristics for UK between 2003 and 2012. The data for publicly traded and private firms comes from *Bureau van Dijk (BvD)'s ORBIS* database. Dependent variable is a measure of ROA or ROE. Public is a dummy variable that takes a value of one if a firm is publicly traded and zero otherwise. R&D is research and development expenditures scaled by total assets. Intangible is intangible assets scaled by total assets. Controls include Ln(Total assets), asset turnover, market share, sales growth, Ln(Firm age), firm risk, leverage, Ln(Unit employee cost), and Ln(Number of branches). ***, **, * represent significance at 1%, 5% and 10% levels, respectively. The t-statistics reported in parentheses are based on standard errors robust to clustering at the firm level. All continuous variables are winsorized at 2.5% at each tail to reduce the impact of outliers (except leverage, which is winsorized to be between 0 and 1).

	(1) ROA EBIT	(2) ROA NI	(3) ROE EBIT	(4) ROE NI
Public	-0.028***	-0.036***	-0.073***	-0.087***
	(-3.58)	(-5.04)	(-3.65)	(-4.90)
R&D flow	-0.000	0.032	-0.195	-0.057
	(-0.00)	(0.88)	(-1.30)	(-0.48)
R&D flow * Public	-0.577***	-0.537***	-0.879***	-0.925***
	(-5.39)	(-5.09)	(-3.73)	(-4.04)
Controls	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes
N	6830	6829	6830	6829
adj. R^2	0.202	0.204	0.109	0.115

Panel B: Informational value of R&D stock

?I would delete intangiles in the table – just discuss it in a footnote?

This panel is same as Panel A except that we use R&D stock instead of contemporaneous R&D expenditures. R&D stock is calculated as the sum of R&D expenditures in the last 3 years (at t-3, t-2, t-1) divided by current asset. We also consider intangible asset scaled by total assets.

	(1) ROA EBIT	(2) ROA NI	(3) ROE EBIT	(4) ROE NI	(5) ROA EBIT	(6) ROA NI	(7) ROE EBIT	(8) ROE NI
Public	-0.026***	-0.036***	-0.061***	-0.081***	-0.030***	-0.042***	-0.065***	-0.107***
	(-2.84)	(-4.15)	(-2.64)	(-3.82)	(-4.93)	(-7.69)	(-4.18)	(-7.83)
R&D stock	-0.007	0.009	-0.055	-0.014				
	(-0.34)	(0.49)	(-0.72)	(-0.22)				
R&D stock * Public	-0.146***	-0.138***	-0.227**	-0.241***				
	(-4.55)	(-4.28)	(-2.51)	(-2.89)				
Intangible					-0.053***	-0.075***	-0.105***	-0.259***
					(-8.55)	(-15.45)	(-3.41)	(-12.98)
Intangible * Public					-0.017	0.001	-0.173***	0.029
					(-1.00)	(0.09)	(-3.43)	(0.71)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	3394	3395	3394	3395	107657	107561	107612	107541
Adj. R^2	0.259	0.240	0.158	0.149	0.119	0.137	0.073	0.081

Panel C: Operating performance following R&D increases

This panel presents the difference in operating profitability between public and private firms following a significant increase in R&D expenditures. Following Eberhart, Maxwell, and Siddique (2004), in order to be included in the sample, both R&D to assets and R&D to sales must be at least 5 % and R&D to assets must increase at least 5% from prior year (e.g., from 6% to 6.3%). Each column shows the difference in ROA EBIT, ROA Net income, ROE EBIT, ROE Net income between public and private firms at (t+1) and (t+2).

	ROA EBIT	ROA NI	ROE EBIT	ROE NI
Mean(Public-Private)$_{t+1}$	-0.142***	-0.133***	-0.266***	-0.252***
	(-7.71)	(-7.62)	(-6.46)	(-6.39)
Mean(Public-Private)$_{t+2}$	-0.118***	-0.119***	-0.297***	-0.260***
	(-3.61)	(-3.71)	(-3.88)	(-3.59)

Table 13: Mean Profitability by Percentage of Ownership

This table shows operating profitability for public and private firms for different shareholder ownership brackets.

	Ownership (0%, 25%]			Ownership (25%, 50%]			Ownership (50%, 100%]		
	Public	Private	Difference	Public	Private	Difference	Public	Private	Difference
ROA EBIT	0.040	0.058	-0.018***	0.029	0.075	-0.047***	0.030	0.077	-0.046***
ROA net income	0.014	0.046	-0.032***	0.003	0.055	-0.053***	0.004	0.063	-0.059***
ROE EBIT	0.125	0.208	-0.082***	0.075	0.280	-0.205***	0.089	0.293	-0.204***
ROE net income	0.047	0.136	-0.089***	-0.007	0.174	-0.181***	0.008	0.208	-0.200***

Table 14: Financial Constraints and Profitability

This table presents regression of various definitions of profitability on firm characteristics and financial constrained status for UK between 2003 and 2012 for raw and industry-size matched samples. The data for publicly traded and private firms comes from *Bureau van Dijk (BvD)'s ORBIS* database. Dependent variable is a measure of ROA or ROE. Public is a dummy variable that takes a value of one if a firm is publicly traded and zero otherwise. Constrained is a dummy variable if a firm-year observation is classified as financially constrained and zero otherwise. To classify a firm as financially constrained vs. unconstrained, we calculate the SA index = (-0.737* Size) + (0.043* Size-square) – (0.040*Age) for each sample firm at the beginning of each year and place firms with index values in the top (bottom) tercile within the year cohort in the constrained (unconstrained) category following Hadlock and Pierce (2010). When we calculate the SA index, total assets are winsorized at 2.5% at the bottom and 2.85 billion pounds at the top. Then we take natural logarithm of size (Following Hadlock and Pierce who winsorize size at 4.5billion 2004 constant US dollars at the top, we convert $4.5billion into 2011 pound by using historical exchange rate and CPI). Definitions of all other variables are same as Table 4 Panel A. The t-statistics reported in parentheses are based on standard errors robust to clustering at the firm level. Industry and year dummies are included in all regressions. ***, **, * represent significance at 1%, 5% and 10% levels, respectively. All continuous variables are winsorized at 2.5% at each tail to reduce the impact of outliers (except leverage, which is winsorized to be between 0 and 1). Monetary values are converted into 2012 constant pound using the British CPI.

Panel A: The effect of financial constraints

	Raw sample				**Matched sample**			
	ROA EBIT	ROA NI	ROE EBIT	ROE NI	ROA EBIT	ROA NI	ROE EBIT	ROE NI
Public	-0.018***	-0.035***	-0.059***	-0.096***	-0.006	-0.025***	-0.022	-0.063***
	(-4.44)	(-9.80)	(-5.11)	(-10.07)	(-1.41)	(-6.15)	(-1.39)	(-5.01)
Constrained	0.024***	0.022***	0.082***	0.079***	0.053***	0.037***	0.158***	0.097**
	(10.49)	(12.24)	(8.25)	(11.26)	(4.22)	(3.53)	(2.89)	(2.47)
Constrained*Public	-0.117***	-0.094***	-0.353***	-0.268***	-0.105***	-0.078***	-0.326***	-0.219***
	(-6.32)	(-5.28)	(-7.97)	(-6.13)	(-5.13)	(-4.20)	(-4.97)	(-4.14)
Ln(Total assets)	0.004***	0.006***	0.013***	0.019***	0.012***	0.012***	0.018**	0.021***
	(5.66)	(10.06)	(4.17)	(8.45)	(6.04)	(6.58)	(2.49)	(3.91)
Ln(Asset turnover)	0.006***	0.005***	0.040***	0.031***	0.009***	0.007***	0.034***	0.024***
	(16.01)	(16.27)	(20.81)	(23.81)	(5.74)	(4.36)	(5.86)	(5.45)
Market share	2.187***	0.941**	9.595***	3.593**	-2.271**	-2.488***	7.859*	1.707
	(4.00)	(2.36)	(4.37)	(2.25)	(-2.30)	(-2.83)	(1.69)	(0.52)
Sales growth	0.076***	0.052***	0.287***	0.201***	0.055***	0.044***	0.133***	0.115***
	(38.29)	(30.68)	(34.56)	(31.75)	(7.29)	(5.97)	(6.09)	(5.14)
Ln(Firm age)	-0.002	0.003***	-0.022***	0.008**	0.001	0.003	-0.001	0.009
	(-1.53)	(4.21)	(-5.00)	(2.49)	(0.25)	(1.37)	(-0.14)	(1.22)
Firm risk	-0.033***	-0.016***	-0.096***	-0.061***	-0.116***	-0.095***	-0.252***	-0.211***
	(-8.05)	(-4.70)	(-5.52)	(-4.99)	(-8.07)	(-6.45)	(-6.43)	(-5.62)
Leverage	-0.092***	-0.097***	0.099***	-0.100***	-0.078***	-0.104***	0.116**	-0.100**
	(-36.42)	(-49.24)	(6.40)	(-9.59)	(-6.99)	(-10.50)	(2.35)	(-2.53)
Ln(Unit employee cost)	-0.006***	0.000	-0.043***	-0.014***	-0.017***	-0.010**	-0.037**	-0.016
	(-3.57)	(0.16)	(-6.45)	(-3.00)	(-3.28)	(-2.13)	(-2.04)	(-1.18)
Ln(Number of branches)	-0.002**	-0.001*	-0.005	-0.001	-0.004**	-0.002	-0.009	-0.001
	(-2.56)	(-1.76)	(-1.62)	(-0.62)	(-2.10)	(-1.57)	(-1.50)	(-0.11)
Constant	0.052***	0.034***	-0.021	-0.052**	-0.026	-0.013	-0.064	-0.037
	(6.66)	(5.40)	(-0.61)	(-2.09)	(-1.11)	(-0.63)	(-0.75)	(-0.56)
N	73839	73776	73809	73764	6328	6325	6323	6323
adj. R^2	0.124	0.133	0.077	0.081	0.144	0.137	0.091	0.092

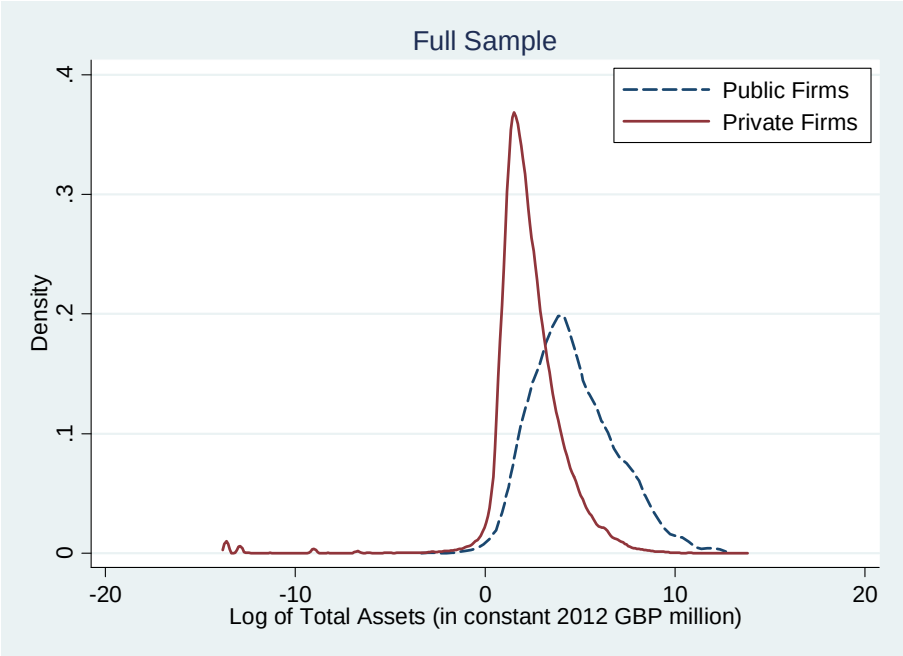
Panel B: Distribution of observations by financial constraints status

	Raw sample				**Matched sample**			
	Public firms		**Private firms**		**Public firms**		**Private firms**	
	N	**%**	**N**	**%**	**N**	**%**	**N**	**%**
Unconstrained	4,110	70.84%	87,039	32.52%	3,868	69.63%	4,124	73.56%
Unclassified	1,081	18.63%	90,065	33.65%	1,080	19.44%	953	17%
Constrained	611	10.53%	90,534	33.83%	607	10.93%	529	9.44%

Figure 1: Distribution of Public and Private Firms by Firm Size

The figures provide kernel density estimates (kernel = epanechnikov, bandwidth = 0.32) for raw sample and matched sample, The matching is based on two-digit SIC industry codes and natural logarithm of total assets in constant 2012 pound (GBP). Wilcoxon-Mann-Whitney test rejects the null hypothesis of no difference in the underlying distributions at 5% level for the raw sample (the null of course is not rejected for the matched sample).

Panel A: Raw sample



Panel B: Matched sample based on 2-Digit SIC and total assets

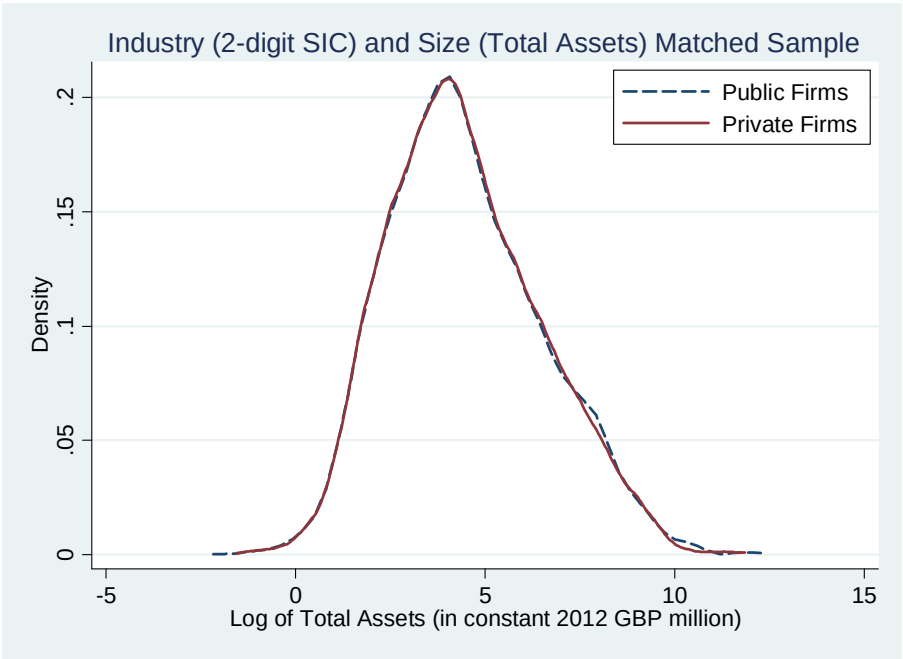


Figure 2: Operating Profitability of Public and Private Firms by Year, 2003-2012

This table presents the evolution of profitability ratios from 2003 to 2012.

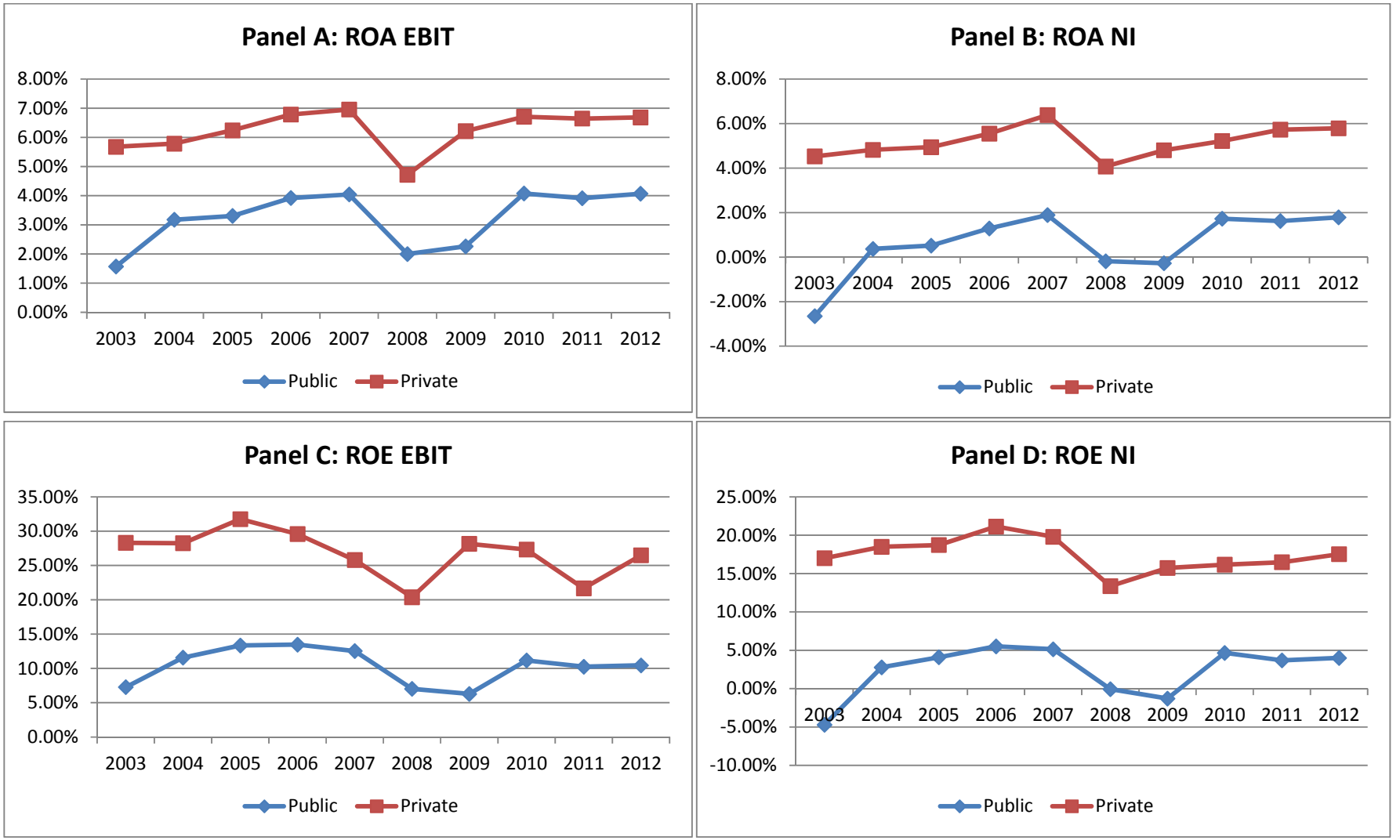


Figure 3: Propensity Score Distribution of Public and Private Firms

The figures provide histogram of propensity scores for raw sample and propensity score matched sample based on nearest-neighbor with-replacement method. Propensity scores for Panel A and B are calculated using a probit model, where dependent variable is public firm dummy. Explanatory variables are Ln(Total assets), sales growth, Ln(Firm age), and industry and year dummies. Propensity scores are estimated for each firm from a probit model with controls on Ln(Total assets), sales growth, Ln(Firm age), industry, and year dummies.

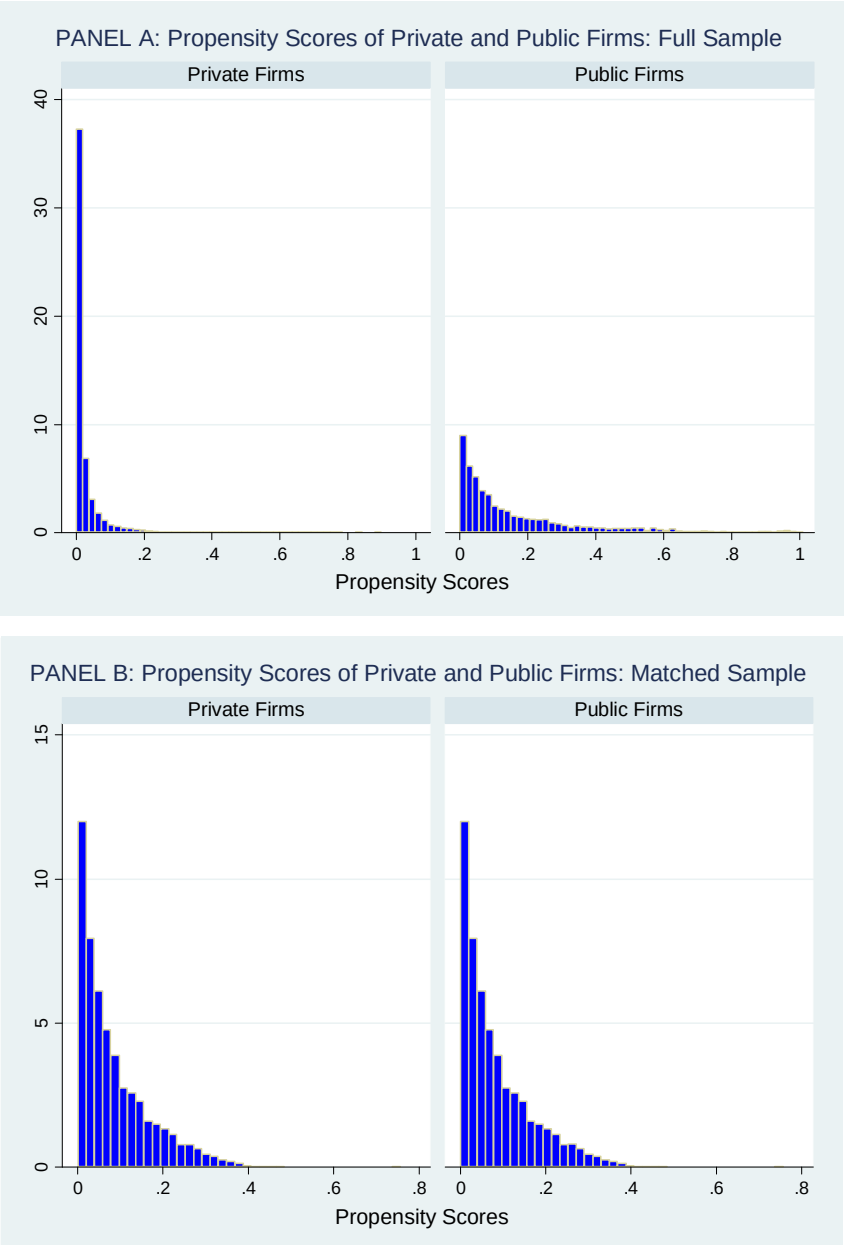
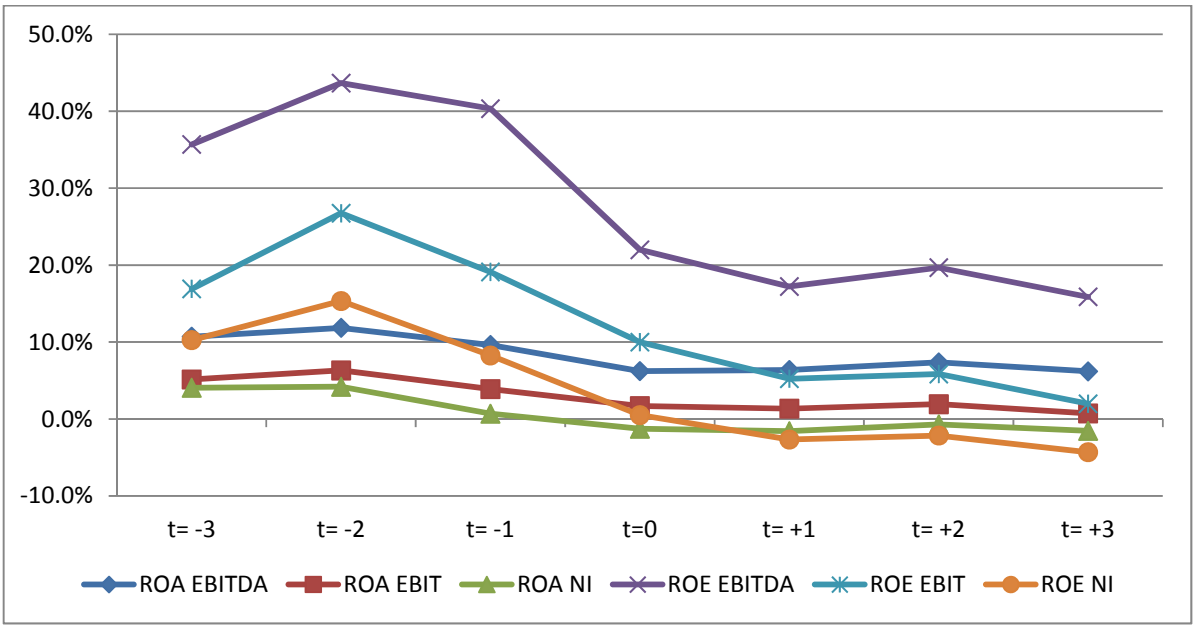


Figure 4: Operating Profitability of IPO Firms

The figures provide mean and median operating profitability for a set of firms that conducted IPO. t=0 refers to IPO year. Firm is private in years -1, -2, -3, and public in years +1, +2, +3. ROA EBITDA is return on assets defined as EBITDA divided by Total assets, and similarly for ROA EBIT, ROA Net Income, and ROE measures.

Panel A: Mean operating profitability



Panel B: Median operating profitability

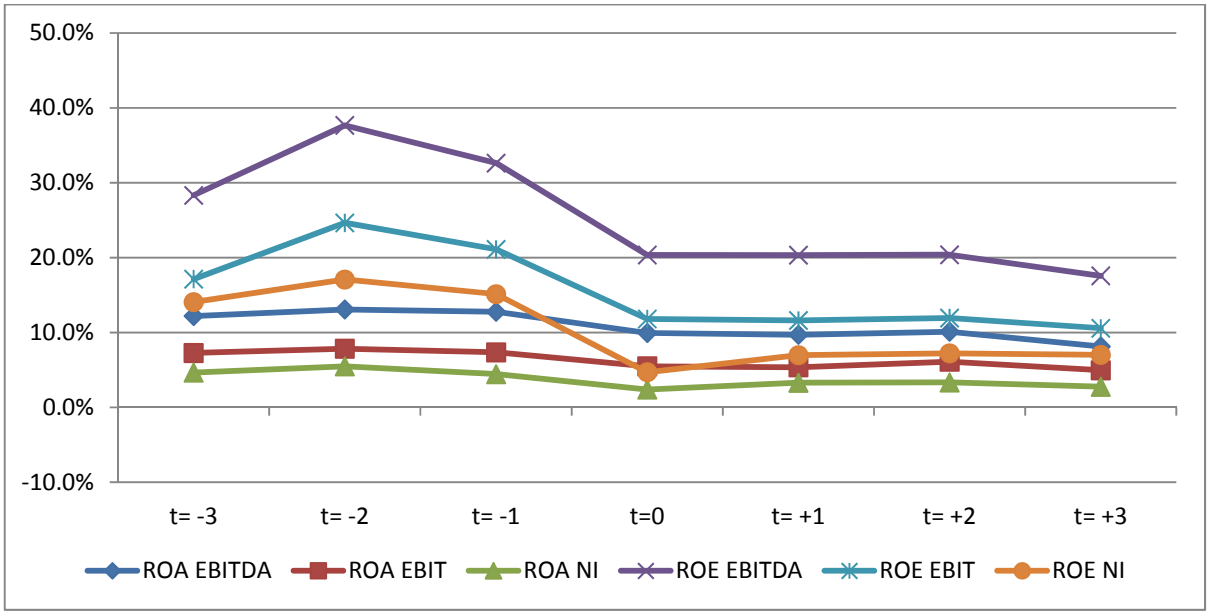
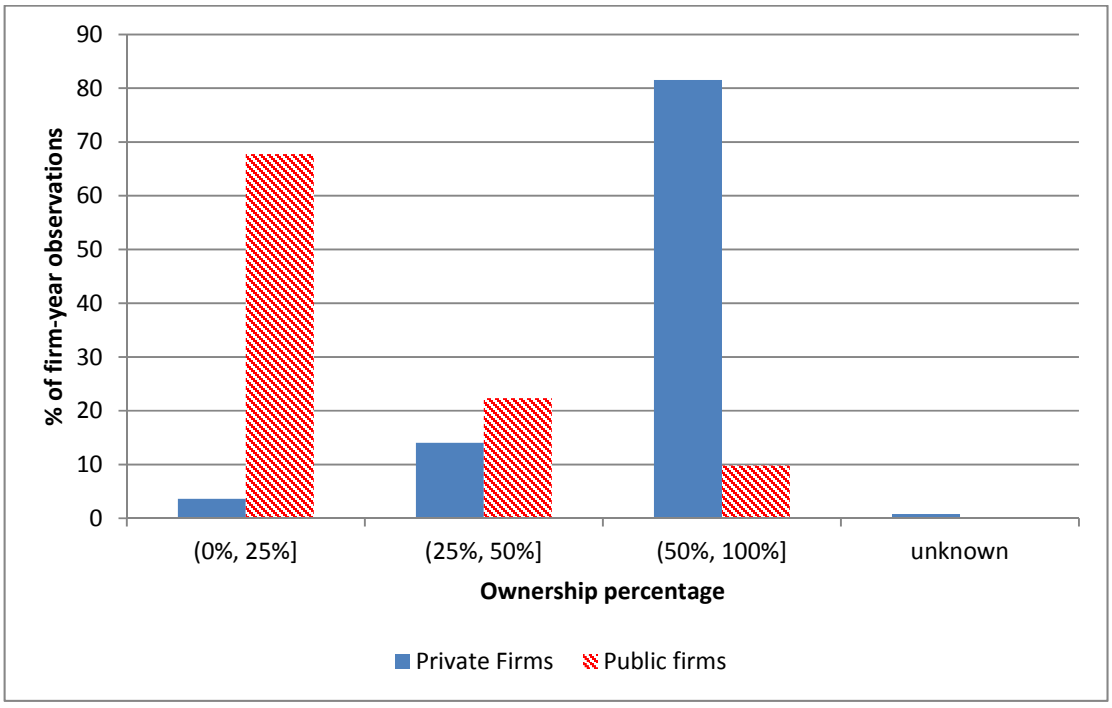


Figure 5: Ownership Distribution

This table presents the ownership distribution of public and private firms in the UK from 2003 to 2012 obtained from Bureau van Dijk's Orbis database for raw sample. (0%, 25%] indicates firm-year observations with at least one known recorded shareholder with no more than 25% ownership in the company. (25%, 50%] indicates firm-year observations with at least one known recorded shareholder with more than 25% but less than or equal to 50% ownership in the company. (50%, 100%] refers to those firm-year observations with at least one known recorded shareholder with more than 50% ownership but less than 100% in the company.



Appendix A: Variable Definitions

General	
Public	A dummy variable that takes a value of one if the firm is public and zero otherwise.
Total assets	Book value of total assets in constant 2011 GBP million.
Revenue	Total operating revenues (Net sales + Other operating revenues+ Stock variations). The figures do not include VAT. Local differences may occur regarding excises taxes and similar obligatory payments for specific market of tobacco and alcoholic beverage industries. Values are in constant 2011 GBP million.
Fixed asset	Total amount (after depreciation) of non-current assets (Intangible assets + Tangible assets + Other fixed assets) scaled by total assets
Intangible asset	All intangible assets such as formation expenses, research expenses, goodwill, development expenses and all other expenses with a long term effect scaled by total assets
Tangible fixed asset	All tangible assets such as buildings, machinery, etc. scaled by total assets
Current asset	Total amount of current assets (Inventory + Accounts receivable + Other current asset) scaled by total assets
Inventory	Total inventories (raw materials +in progress + finished goods) scaled by total assets
Accounts receivable	Trade receivables from clients and customers scaled by total assets
Cash and equivalents	Detail of the Other current assets =Only the amount of cash at bank and in hand of the company scaled by total assets
Cash flow	Operating cash flows scaled by total assets
Accounts payable	Debts to suppliers and contractors scaled by total assets
Long-term debt	Long term financial debts (e.g., to credit institutions (loans and credits), bonds) scaled by total assets
Short-term debt	Short term financial debts (e.g., to credit institutions + part of Long term financial debts payable within the year, bonds, etc.) scaled by total assets
Total debt	(Long-term debt +Short-term debt) scaled by total assets
Working capital	Indicates how much capital is used by day to day activities= Inventory + Accounts Receivable –Accounts Payable scaled by total assets
Net working capital	Working capital – cash and equivalents scaled by total assets
Capital Intensity	Firm's capital stock / total employment
Market Share	Firm's market share at the 2-digit SIC level (operating revenue / total 2-digit SIC level operating revenue)
Firm Risk	Standard deviation of sales in the past 5 years / mean of sales in the past 5 years. At least 3 years of data is required for each firm to calculate this ratio.
R&D	Total amount of expenses on research and development activities scaled by total assets
Number of employees	Number of employees
Firm age	Years since firm's founding
Number of branches	Number of branches
Profitability	
ROA EBITDA	EBITDA scaled by total assets
ROA EBIT	EBIT scaled by total assets
ROA (NI/TA)	Net income scaled by total assets

ROE EBITDA	EBITDA scaled by shareholders' funds
ROE EBIT	EBIT scaled by shareholders' funds
ROE Net income	Net income scaled by shareholders' funds
EBIT margin	EBIT scaled by operating revenue
Net income margin	Net Income scaled by operating Revenue
Cash flow / Op. revenue	Cash flow scaled by operating revenue
Sales-to-equity	Operating revenue divided by equity
Efficiency	
Asset efficiency	Average tangible fixed asset turnover = Operating revenue divided by average tangible fixed assets (average tangible fixed asset is calculated as tangible fixed asset at the beginning of year and end of year divided by 2)
Inventory turnover	Operating revenue / inventory
Collection period	(Average accounts receivable / Operating revenue) * 360 . Average accounts receivable is calculated as accounts receivable at the beginning of year and end of year divided by 2.
Credit period	(Average accounts payable / Operating revenue) * 360. Average accounts payable is calculated as accounts payable at the beginning of year and end of year divided by 2.
Interest coverage	Operating profit / Interest paid
Structural ratios	
Liquidity	(Current asset – Inventory) / Current liabilities
Current ratio	Current asset / Current liabilities
Equity/Asset	Total shareholder's equity / total assets
Debt-to-equity	((Non-current liabilities + Long-term debt) / Equity)
Productivity	
EBIT per employee	EBIT divided by number of employees on payroll
EBITDA per employee	EBITDA divided by number of employees on payroll
Net income per employee	Net income divided by number of employees on payroll
Revenue per employee	Revenue divided by number of employees on payroll
Cost of employee/revenue	Total cost of employees divided by operating revenue
Equity per employee	Total Equity divided by number of employees on payroll
Unit employee cost	Total cost of employees divided by total employees
Growth	
Sales growth	Growth in operating revenue from time t-1 to time t
Gross investment	Change in total fixed assets from (t-1) to (t) scaled by beginning of year total assets
Fixed asset growth	(Fixed asset(t)- Fixed asset(t-1))/ Fixed asset(t-1)
Employee growth	(Number of employees(t) - Number of employees (t-1)) / Number of employees (t-1)
Volatility	
Earnings volatility	Standard deviation of operating revenue to asset ratio for all available observations for each firm
Cash flow volatility	Standard deviation of cash flow for each firm for all available observations

Appendix B: Additional Specifications for Profitability

This table presents regression of various definitions of profitability on firm characteristics for UK between 2003 and 2012. The data for publicly traded and private firms comes from *Bureau van Dijk (BvD)'s ORBIS* database. Dependent variable is a measure of sales margin, calculated as EBIT or Net Income divided by Operating Revenue. Public is a dummy variable that takes a value of one if a firm is publicly traded and zero otherwise. See Appendix A1 for the definition of independent variables. The t-statistics reported in parentheses are based on standard errors robust to clustering at the firm level. Industry and year dummies are included in all regressions. ***, **, * represent significance at 1%, 5% and 10% levels, respectively. All continuous variables are winsorized at 2.5% at each tail to reduce the impact of outliers (except leverage, which is winsorized to be between 0 and 1). Monetary values are converted into 2012 constant pounds using the British CPI.

	Raw sample		**Matched sample**	
	EBIT margin	NI margin	EBIT margin	NI margin
Public	-0.098***	-0.112***	-0.047***	-0.079***
	(-7.72)	(-10.05)	(-4.13)	(-7.69)
Ln(Total assets)	0.015***	0.014***	0.045***	0.043***
	(19.15)	(20.25)	(8.18)	(8.45)
Ln(Asset turnover)	-0.002***	-0.001	0.037***	0.033***
	(-2.76)	(-0.96)	(4.89)	(5.10)
Market share	4.605***	3.276***	-12.827***	-14.883***
	(4.11)	(3.86)	(-4.50)	(-5.17)
Sales growth	0.063***	0.038***	0.147***	0.122***
	(13.64)	(9.60)	(4.33)	(4.37)
Firm age	-0.002*	0.005***	0.008	0.015**
	(-1.83)	(4.77)	(1.18)	(2.36)
Firm risk	-0.096***	-0.057***	-0.553***	-0.449***
	(-9.13)	(-6.10)	(-8.73)	(-8.19)
Leverage	-0.041***	-0.070***	0.044	-0.066**
	(-11.62)	(-24.33)	(1.28)	(-2.24)
Unit employee cost	-0.004	0.001	-0.083***	-0.050**
	(-1.47)	(0.26)	(-4.03)	(-2.56)
Ln(Number of branches)	-0.007***	-0.004***	-0.023***	-0.017***
	(-8.28)	(-5.98)	(-4.68)	(-3.89)
Industry	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes
Constant	0.044***	0.024**	-0.380***	-0.283***
	(3.70)	(2.34)	(-4.31)	(-3.68)
N	110076	109978	7540	7543
adj. R^2	0.075	0.074	0.201	0.190

Appendix C: Baseline Profitability Model by Subsample

This table presents regression of profitability on firm characteristics for public and private firms estimated separately for UK between 2003 and 2012. Columns (3) and (6) provide the Chi-square test statistics for Chow test of difference in coefficients for unmatched and matched samples, respectively. The data for publicly traded and private firms comes from *Bureau van Dijk (BvD)'s ORBIS* database. Dependent variable is ROA, measured as EBIT over book value of assets. Public is a dummy variable that takes the value of 1 if a firm is publicly traded and zero otherwise. See Appendix A1 for the definition of independent variables. The t-statistics reported in parentheses are based on standard errors robust to clustering at the firm level. Industry and year dummies are included in all regressions. ***, **, * represent significance at 1%, 5% and 10% levels, respectively. All continuous variables are winsorized at 2.5% at each tail to reduce the impact of outliers (except leverage, which is winsorized to be between 0 and 1). Monetary values are converted into 2012 constant pounds using the British CPI.

	Raw sample			**Matched sample**		
	(1) ROA EBIT Public firm sample	(2) ROA EBIT Private firm sample	(3) Chow Test: Chi-Square statistic of (1) and (2)	(4) ROA EBIT Public firm sample	(5) ROA EBIT Private firm sample	(6) Chow Test: Chi-Square statistic of (4) and (5)
Ln(Total assets)	0.025***	-0.002***	122.05***	0.026***	-0.005***	95.08***
	(9.66)	(-2.93)		(9.63)	(-2.76)	
Ln(Asset turnover)	0.012***	0.007***	13.82***	0.014***	0.008***	10.17***
	(3.72)	(18.93)		(4.55)	(5.88)	
Market share	-2.249***	14.799***	99.81***	-6.839***	3.621***	36.40***
	(-2.78)	(4.76)		(-4.93)	(2.74)	
Sales growth	0.057***	0.082***	28.13***	0.056***	0.045***	0.54
	(7.26)	(54.53)		(7.19)	(4.52)	
Ln(Firm age)	0.007**	-0.009***	22.83***	0.005	-0.004	3.76*
	(1.96)	(-11.75)		(1.36)	(-1.37)	
Firm risk	-0.138***	-0.021***	45.13***	-0.136***	-0.046***	11.19***
	(-7.96)	(-6.29)		(-8.12)	(-3.51)	
Leverage	-0.084***	-0.093***	3.38*	-0.073***	-0.076***	1.89
	(-3.20)	(-43.23)		(-2.77)	(-7.64)	
Ln(Unit employee cost)	-0.019***	-0.003**	3.52*	-0.021***	-0.000	5.02**
	(-3.04)	(-2.25)		(-2.96)	(-0.01)	
Ln(Number of branches)	-0.004	-0.002**	0.01	-0.003	-0.002	0.17
	(-1.37)	(-2.57)		(-1.10)	(-1.12)	
Constant	-0.134***	0.104***	7.20***	-0.142***	0.111***	21.00***
	(-4.22)	(17.33)		(-4.19)	(4.80)	
N	4573	105517		4436	3118	
adj. R^2	0.222	0.124		0.226	0.124	