

## Vertical and Horizontal Agency Problems in Private Firms: Ownership Structure and Operating Performance

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### Abstract

We investigate how ownership structure influences operating performance and implied agency costs. Our sample includes over 42,000 U.K. private and public firms. We document several new results of considerable economic significance relating to: (a) horizontal agency costs arising from unequal ownership within private firms, (b) amplification of agency costs from joint presence within the same firm of horizontal agency problems and vertical agency problems arising from separation of ownership and control, (c) mitigation in agency costs wrought by a second large shareholder, (d) impact of complex ownership structures, and (e) agency cost differences between public firms and comparable private firms.

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# Vertical and Horizontal Agency Problems in Private Firms: Ownership Structure and Operating Performance

## 1 Introduction

Agency problems arise when managers and/or controlling shareholders have the ability to redirect or consume corporate resources in ways that benefit themselves but which are not in the best overall interests of the company's owners, including the minority owners.<sup>1</sup> "Vertical" agency problems between owners and managers arise from separation of ownership and control. "Horizontal" agency problems between controlling and minority shareholders arise from conflicting interests due to their unequal ownership. Both types of agency problems can contribute, individually or jointly, to agency costs in the form of an associated reduction in company performance, cash flows, and value.

Except for Ang, Cole, and Lin (2000), Nagar, Petroni, and Wolfenzon (2011), and Bitler, Moskowitz, and Vissing-Jorgensen (2005) – who use data on private companies to examine selected aspects of some vertical agency problems on their own and the specific horizontal agency problem created by majority control – decades of earlier empirical research on agency costs has focused almost exclusively on publicly traded companies, and has done so through measures anchored in market prices.<sup>2</sup> However, there are fundamental differences in the nature, relevance and balance of horizontal and vertical agency costs between privately-held and publicly-traded firms (Easterbrook and Fischel, 1985), not just in relation to the separation between risk-bearing and management, but also because public trading provides an alternative to "voice" by enabling the "exit" (or "Wall Street Walk") of unhappy shareholders (Bhide, 1993; Coffee, 1991; Admati and Pfleiderer, 2009). Furthermore, as Asker, Farre-Mensa, and Ljungqvist (2015) emphasize, private companies are important as they dominate overwhelmingly in terms of their numbers, their sales, and the private-sector employment they provide; representing, for example, more than 99.9% of all U.S. firms, and 86.4% of even the relatively larger firms with more than 500 employees.

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<sup>1</sup> The extensive literature on agency issues stems from the seminal work of Berle and Means (1932) and Jensen and Meckling (1976); and includes, *inter-alia*: Shleifer and Vishny (1986), Holmstrom and Kaplan (2001), Holmstrom and Kaplan (2003), Becht et al. (2003), Denis and McConnell (2003), Hermalin (2005), Tirole (2006), and Djankov et al. (2008). The vertical agency problem emerges from the view of the firm as a nexus of contracts that are costly to enforce (Coase, 1937; Alchian and Demsetz, 1972; Ross, 1973; Jensen and Meckling, 1976; Fama and Jensen, 1983b,a). In contrast, horizontal agency problems arise from the exploitation of minority shareholders by a controlling shareholder (Grossman and Hart, 1980; Stulz, 1988; Burkart et al. 1997, 1998; Gilson and Gordon, 2003; Dyck and Zingales, 2004; Bennedsen and Wolfenzon, 2000; Shleifer and Wolfenzon, 2002; Gomes and Novaes, 2005; and Laeven and Levine, 2008). See Roe (2005) for a review.

<sup>2</sup> Bitler et al. (2005) test their principal-agent model using data from consumer and small business surveys of households and private firms. However, their focus is unrelated to the agency issues examined in this paper. Ang et al. (2000) and Nagar et al. (2011) are directly relevant to this paper. They examine the same 1,708 private firms classified as small businesses in a 1992 dataset based on voluntary responses to telephone surveys. Ang et al. (2000) find that agency costs are higher for firms not managed by owners, decrease as managerial ownership increases, and increase as the number of shareholders increase. Nagar et al. (2011) find that firms with majority shareholder control have higher agency costs.

The growing interest in private firms is reflected in several empirical papers comparing public and private firms.<sup>3</sup>

Our overwhelming focus in this paper is on agency costs in private firms. Our main objective is to build very significantly on Ang et al. (2000) and Nagar et al. (2011) by empirically investigating the individual and comparative significance of overall vertical and horizontal agency problems in private firms, each on their own and when jointly present in the same firm. Additionally, our objective is also to contextualize our results on private firms by comparing overall agency costs in publicly traded firms with those in matched private firms. Our agency cost proxies are not based on market price related measures, but on the “residual loss” emphasized in Jensen and Meckling (1976): i.e., the loss in operating performance and the incremental costs associated with agency problems’ related inefficiencies. We accordingly analyze operating performance and efficiency of firms across the full spectrum of ownership and management arrangements ranging from owner or non-owner managed single or multiple owner firms, to publicly traded companies.

While we cannot use market-based measures anyway since our primary focus is on private firms, agency cost estimates reflected in inefficient asset utilization (arising from poor investments or the appropriation of resources), higher operating expenses (due to excessive costs including abnormal compensation and perks), and lower revenues and earnings (resulting from insufficient effort exerted by management) are independently very valuable as agency cost proxies (Tirole, 2006). The literature largely lacks such estimates even for public companies.<sup>4</sup> Accordingly, as in Ang et al. (2000), our first proxy is the asset turnover ratio (“AT”), which reflects how efficiently management utilizes the assets under its control for revenue generation. Our second proxy, as in Ang et al. (2000) and Nagar et al. (2011), is cost efficiency measured as operating expenses divided by sales (“OPEXP”). Our third proxy, as in Nagar et al. (2011), captures aggregate efficiencies as the ratio of earnings before interest, taxes and depreciation to total assets (“EBITD”). Our last proxy, in robustness tests, is based on abnormal executive compensation and its sensitivity to performance.

We make several important new contributions to the agency cost literature, and each of these represent the first empirical examination of the issue involved.

First, we investigate overall horizontal agency costs in private firms. Unequal ownership stakes across shareholders can lead to controlling shareholders extracting private benefits of control by forcing decisions which expropriate minority shareholder wealth. Ang et al. (2000) do not examine horizontal

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<sup>3</sup> For example, Saunders and Steffen (2011), Michael and Roberts (2012), and Gao, Harford, and Li (2013) compare economic variables (other than agency costs) for public and private firms.

<sup>4</sup> Exceptions are Singh and Davidson (2003), and cases where we narrowly measure perquisites and the like (as, for example, in Yermack, 1996).

agency costs; and the Nagar et al. (2011) analysis covers just one single issue – the effect of the presence of majority (>50%) control by a controlling shareholder. Horizontal agency problems can be extensively present in private firms – more than half of the non-single-owner private firms, corresponding to about 75% of total asset value of such firms, potentially face horizontal agency problems. We find that agency costs arising from horizontal agency problems are, on average, significantly greater than those from vertical agency problems. While the reduction in AT due to vertical and horizontal agency problems is similar in magnitude, the increase in OPEXP is about four times higher for horizontal agency problems relative to vertical agency problems, and the decrease in EBITD is about twice as much. Overall, we estimate that the aggregate incremental annual operating expenses attributable to horizontal agency problems in private firms was about 1.2% of annual GDP, and the associated loss of earnings was about 0.5% of annual GDP.

Second, we empirically investigate the relative impact of vertical and horizontal agency problems just on their own, and the amplification or reduction from both being jointly present in the same firm. We find that the interactive joint presence of both horizontal and vertical agency problems results in very significant amplification of overall agency costs: on average, it increases OPEXP and decreases EBITD by an amount about equal to the effect of vertical agency problems on their own; and doubles the decrease in AT resulting from both horizontal and vertical agency problems together on their own. Our estimates of the incremental annual operating expenses in private firms associated with only vertical agency problems, and those in private firms associated with only horizontal agency problems, were each relatively small, corresponding to about 0.1% of GDP each, but the incremental annual operating expenses in private firms associated with both vertical and horizontal agency costs were large, about 1.8% of GDP that year, with a corresponding estimated loss in aggregate earnings about 1% of GDP. About 25% of the magnitude of these estimates arise from the interaction effect of both horizontal and vertical agency problems being present in the same firm.

Third, we examine the mitigating effect on horizontal agency costs of “contestability” in control through the presence of a second shareholder with a significantly large ownership interest alongside the controlling shareholder. Expropriation by the controlling shareholder should arguably be relatively less if there is greater concentration of ownership among non-controlling shareholders (Pagano and Roell, 1998), and in firms where the difference in the stakes of the controlling shareholder and that of the second largest shareholder is relatively smaller (Bloch and Hege, 2003). Majority (>50%) control should also make it easier for controlling shareholders to expropriate firm resources for their selective benefit. Because of their data limitations, Nagar et al. (2011) just examine the effect of majority control. We examine the effect of a second large shareholder, conditional on the presence or absence of majority

control with the controlling shareholder. Our results indicate that a second large shareholder significantly mitigates horizontal agency costs, with reduced but still significant impact when the controlling shareholder does have majority control. We also find that a second large shareholder matters much more than the presence or absence of majority control in mitigating horizontal agency costs.

Fourth, we explore how agency costs in private companies are affected by complexity in ownership structure in the form of joint ownership of individuals/families together with corporate entities, often private equity firms. Such co-ownership creates relatively complex monitoring incentives and frameworks that could potentially distort the monitoring influence of both the individual/families as well as these corporate entities. The motivation for this analysis also arises from its specific policy relevance, given the increasing use by young firms, and for longer periods of time, of private (rather than public) markets to raise capital (Doidge et al. 2018), and the consequent influence of private equity firms. We find that operating performance of firms co-owned by corporate entities is significantly worse.

Finally, we present the first direct empirical evidence on a foundational hypothesis that widely held firms that are publicly traded should exhibit higher agency costs relative to comparable private firms (Jensen, 1989), not only because the incentives of shareholders to monitor managers decrease as their numbers increase or ownership share decreases, but also because public trading enables unhappy shareholders to easily “exit” rather than invest in governance through “voice”. Based on industry-level data on different industry groups, and the fraction of public and private firms in each of these groups, Cooper and Priestley (2016) conclude that the “cost of capital and firm valuations are similar across public and private firms.” However, their analysis does not have enough resolution for any agency cost related inferences, and the evidence would be indirect or tangential in multiple ways. Other extant research has focused on specific aspects of agency costs. For example, Edgerton (2012) finds that public firms overuse corporate jets relative to similar private firms; and Asker et al. (2015) find that short-termism pressures negatively distort investment decisions in public firms. We test directly for overall agency costs reflected in operating performance and efficiency, and we find strong empirical evidence that public firms have significantly higher agency costs relative to otherwise similar duly matched private firms subject to the same accounting and legal regimen.

We also add considerable value through the U.K. dataset we use for our investigations. First, the dataset includes an exceptionally *large* number of firms – our main tables are based on over 42,000 unique private and public U.K. firms, covering a multi-year period with over 109,000 firm-year observations; and our robustness tests include over 200,000 different firms with over 500,000 firm-year observations. Second, our dataset is reasonably *comprehensive* in as much as it includes almost *all* companies of any particular type that we select based on chosen criteria, without any selection-related

biases. This makes the cross-section of companies we examine objectively diverse across industries and company size. Third, the dataset has *breadth* in as much as it includes the full spectrum of ownership and management arrangements – ranging from owner or non-owner managed single or multiple owner firms, through to publicly traded firms. In this context, the accounting regulations faced by U.K. public and private firms are also largely equivalent in terms of filing obligations, accounting standards, audit requirements, and tax laws; thereby ensuring comparability across private firms of different size and ownership structures, and comparability between private and public firms (Ball and Shivakumar, 2005). Finally, the dataset has *depth* in as much as it contains multi-year information on a wide array of accounting variables for each sample firm, besides the firm’s ownership and management arrangements. This enables us to undertake the investigations described above, that we regard as important new contributions to the literature.

In view of the size, comprehensiveness, breadth, and depth of our data, we are also able to show that each of our conclusions holds in multiple testing formats – from simple univariate hypotheses tests of differences in averages or medians of matched samples (matched by size and industry); to simple OLS regressions controlling for firm characteristics; and finally after controlling for endogeneity and firm characteristics through instrumental variable regressions.

In contrast, both the earlier studies that examine agency costs in private firms – Ang et al. (2000) and Nagar et al. (2011) – are based on the same 1992 self-reported data on 1,708 domestic U.S. companies (designated as small businesses) collected via telephone survey methods as part of the National Survey of Small Business Finances (NSSBF). This NSSBF data also provided relatively limited information on ownership structure: primary owner’s ownership share, existence of majority control, number of non-manager shareholders, and whether the firm was owner-managed. Ang et al. (2000) and Nagar et al. (2011) are not able to concomitantly examine public companies (as we do) because their data covered only private companies, and their examination of private companies cannot be credibly extended to make inferences for the economy as a whole (as we do) because their sample is not necessarily representative, given that it selectively includes only firms voluntarily self-reporting on phone.<sup>5</sup>

Given that our sample is large and reasonably comprehensive – covering almost *all* eligible firms in the economy based on whatever criteria we specify, and our agency cost proxies are based on actual performance and cash flows – we are able to generate economic implications of agency costs for the economy as a whole. We can identify a base set of firms with arguably zero agency costs – no vertical agency costs due to separation of ownership and control, and no horizontal agency costs arising from

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<sup>5</sup> In this context, among other investigations that are not necessarily new contributions per se, we document, based on our large and selection-bias-free sample, a reaffirmation of the main results of Ang et al. (2000) on vertical agency costs.

expropriation of minority shareholders by controlling shareholders. A comparison of corresponding agency cost proxies across multiple sets of firms matched by size and industry thereby enables a reasonable level of quantification of the absolute magnitude of agency costs, something that is not feasible if we only examine public companies, or when we have a small and selectively-specified sample, as in Ang et al. (2000) and Nagar et al. (2011).

We make back-of-the-envelope estimates of two variables, both of which provide an aggregate dollar value for agency costs, i.e., dollar losses potentially attributable to agency problems: (a) incremental operating expenses and (b) incremental loss in aggregate earnings. The total incremental annual operating expenses attributable to agency problems across all firms are astronomical, estimated by us as equivalent to 5.6% of the U.K. GDP. The figures estimated as a proportion of GDP are clearly not necessarily extrapolatable to the U.S. and the global economy today; but if they were, they would imply overall incremental annual operating expenses attributable to agency costs of about \$1 trillion dollars for the U.S. economy in 2019, and over \$4 trillion dollars for the global economy in 2019. The estimates based on annual loss in earnings in firms with agency problems are consistently also very large and economically highly significant: equivalent to about 3.2% of U.K. GDP.

Manageably small firms that do not need significant funding, or the specialized skills and innovative abilities of other shareholders or managers, could plausibly remain reasonably free of agency problems. Agency problems are otherwise inherent in larger and more complex firms. However, public policy can be structured to incentivize mitigation of these problems and their economic costs. While we leave a detailed examination of policy prescriptions for future scholarship, our conclusions in relation to each of our new contributions to the literature have significant public policy implications.

The rest of the paper is organized as follows. Section 2 covers data, empirical methods, instrumental variables to account for endogeneity, and control variables used in estimations. Section 3 analyzes vertical and horizontal agency problems in private firms, focusing on differences between owner-managed and non-owner-managed firms, between firms with unequal and equal co-ownership, and the incremental effect of both vertical and horizontal agency problems being present in the same firm. Section 4 examines the impact of contestability in control through the presence of a second large shareholder, with or without majority control of the controlling shareholder. Section 5 tests for the effect of co-ownership by corporate entities. Section 6 examines differences in agency costs between public and private firms. Section 7 documents robustness checks: first, through results based on a considerably larger sample of firms; and second, through agency cost proxies based on executive compensation. Section 8 summarizes economic and public policy implications of our findings. Finally, Section 9 concludes.

## 2 Data and Research Design

### 2.1 Private and Public Company Data

This paper is based on a large and selection-bias-free sample of U.K. public and private firms spanning a wide array of ownership structures ranging from firms with a single owner-manager to firms with multiple owners and outside managers, and publicly traded firms. The financial reporting regulations for U.K. companies are substantially equivalent for all firms. Three principal features of these regulations motivate our use of U.K. data, and provide assurance regarding its quality and relevance in the context of our study. First, the U.K. Companies Act requires all private and public companies to file annual financial statements that comply with the same accounting standards. Second, financial statements filed by all U.K. public and private companies must be audited.<sup>6</sup> Third, private and public companies are subject to the same tax laws. These standards therefore ensure that we have a set of comparably measured data for both public and private companies. In addition, and importantly, the data filed provides information on the ownership structures of the filing companies, both private and public.

Our data comes from the FAME database produced by *Bureau Van Dijk*. Each FAME update contains the latest available ownership and management structure data and up to 10 years of financial statement data for all public and private companies registered in the U.K. and Ireland. Releases dated October 2005, October 2006, November 2007, October 2008, October 2009 and October 2010 are the sources for our data. FAME, the commercial source of the data, no longer sells the DVDs from which the data were extracted.

We identify all firms classified as private limited, public quoted, public quoted AIM, public quoted OFEX, and public not quoted.<sup>7</sup> Our initial minimum assets and sales criteria result in a sample of 1,332,576 firm-year observations. After excluding firms with missing SIC codes and information on the type of accounts filed and limiting the sample period to 2002 and later, we obtain a sample of 1,299,704 firm-year observations. The details regarding all exclusions are reported in Appendix A. We require that firms are stand-alone (i.e., not subsidiaries of other companies), and that lagged ownership data with non-missing shareholder names are available. We only retain firms that have both ownership and financial information available. We also exclude firms in the financial and utility industries. This criterion results

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<sup>6</sup> Companies designated as “small” and “medium” sized can claim exemptions from either or both the audit requirement and the accountant’s report requirement. They are also allowed to file abridged financial statements. For accounting periods ending after January 30, 2004, a company is considered small (medium) if one of the following requirements are met: (i) annual revenues are less than £5.6 (£22.8) million; (ii) balance sheet total is £2.8 (£11.4) million or less; and (iii) number of employees is less than 50 (250). Small companies can be exempt from both audit and accountant’s report requirements, whereas medium companies can be exempt only from auditing requirements but do need an accountant’s report. For more details please refer to the website of the U.K. Companies House.

<sup>7</sup> Firms belonging to the public quoted category are listed on the London Stock Exchange (LSE). Firms belonging to the public quoted AIM group are listed on the Alternative Investment Market (AIM). OFEX is an independent public market specializing in smaller companies who do not wish to incur the expense of listing with AIM or LSE.



in a sample of 500,087 observations. Finally, we exclude firms that are exempt from the auditing requirements of the U.K. Companies House. This selection criterion leads to the exclusion of very small private firms and ensures all the firms in our sample face the same accounting and reporting regulations.

The final sample contains 109,534 firm-year observations. There are a total of 6,156 public firm-year observations corresponding to 1,761 unique public firms and 103,378 private firm-year observations corresponding to 40,698 unique private firms in our sample. In robustness tests, we repeat our base analysis by including private firms that are exempt from auditing requirements (i.e., a sample of 500,087 firm-year observations from 217,025 unique firms spanning fiscal years 2002-2010) and find that the conclusions and findings presented in later sections are not influenced by these size criteria.<sup>8</sup>

Panel A of Table 1 presents the distribution of the full sample of public and private firms, and subsamples of private firms reflecting firms owned by a single individual, firms owned by a single family, firms owned by multiple families, and firms co-owned by corporate entities. It also presents company-level summary statistics for the public and private firms in our sample, and for firms in different ownership groups. To mitigate the effect of outliers, we winsorize the top 1 percent and bottom 1 percent of all financial variables. Definitions of all variables used in this study are provided in Appendix B.

Private firms are typically smaller and younger than public firms. The mean asset value of private firms in our sample is £32.5 million whereas the corresponding value for public firms is £906.9 million. Private firms in our sample are, on average, more levered (average debt-to-asset ratio of 41.6% compared to 23.7% for public firms), consistent with the statistics reported by Brav (2009). We also report “Quiscore”, a measure of the probability of company failure (widely used commercially in the U.K.), computed using a proprietary model and based on variables conceptually similar to those employed in the computation of the Altman Z-score. The distribution of Quiscores across ownership classifications indicates the index values for the sample firms tend to fall in the normal or better regions. With respect to ownership and management structures, we were able to account for 99.1% of the ownership stakes of private firms on average and approximately 72% for public firms. Average managerial ownership is 57% for private firms and 17% for public firms where data are available. Owner managed firms account for nearly 18% of private firms, where we define owner-managed firms as firms in which managers own more than 99% of the firm.

Firms owned by a single individual are, on average, smaller and younger than firms owned by other groups. 77% of single owner firms are owner-managed. A significant proportion of all private firms have a bank loan, and the average bank debt to total assets ratio decreases monotonically as we go from firms

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<sup>8</sup> Our main results are based on an unbalanced panel of public and private firms. A balanced panel is created by limiting the sample period to 2005 to 2009 and including only those firms that are a.) not associated with changes in ownership structure during the period and b.) present for all years in the sample period. Again, our results are qualitatively similar to those presented later and are available on request.

owned by a single individual to firms owned by multiple individuals and holding companies.

Panel B of Table 1 presents information on the industries to which the sample firms belong, separately for public and private firms, and for the full sample. There are significant variations in how private and public firms are distributed among industry sectors. While only 13% of private firms belong to the manufacturing sector, nearly 30% of public firms belong to this sector. On the other hand, we observe that the proportion of firms belonging to the construction and real estate sectors is higher in private firms. In sum, these differences highlight the importance of controlling for industry effects in the analyses to follow.

## 2.2 Empirical Approach

### 2.2.1 Accounting for Endogeneity

Endogeneity is potentially an issue for the econometric models we specify and estimate if ownership structure and our measures of agency costs are jointly determined. We estimate pooled linearly specified models using two-stage least squares. We use geography and industry-based variables to instrument for ownership and management structures. Our hypothesis is that companies with headquarters in close geographical proximity, or that have similar industry characteristics, are likely to share similar ownership and organizational characteristics. Our use of location and industry-based variables as instruments is motivated by Becker, Cronqvist, and Fahlenbrach (2011), Knyazeva, Knyazeva, and Masulis (2013), and Karpoff, Schonlau, and Wehrly (2017). Geography based measures have been used in prior studies as instruments that affect corporate structure but are unrelated to firm performance.<sup>9</sup> We construct the instruments by using two cohorts of firms that share historically with the focus firm either the decision to place headquarters within a certain geographical location, or the choice of industry classification. Given the headquarters decision and the industry classification decision are generally made at incorporation and are rarely changed thereafter, both of these decisions are likely to have been made by all of the firms in our sample many years before the years we study. We require that each of the cohorts contain a minimum of three firms other than the focus firm. Descriptions of the instruments we employ are provided in Appendix C.

Following standard econometric methods, we ensure that the instruments satisfy two requirements. First, the instrumental variables should be correlated with the observed ownership and management structures. Our results confirm this is indeed the case.<sup>10</sup> Second, the instrumental variables should be

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<sup>9</sup> Geography and firm location have been examined in various contexts including the effects of location on small business lending (Petersen and Rajan, 2002), acquirer returns (Uysal, Kedia, and Panchapagesan, 2008), creation and utilization of human capital (Almazan, De Motta, and Titman, 2007), efficiency of decision making (Landier, Nair, and Wulf, 2009), option grants (Kedia and Rajgopal, 2009), and stock returns (Pirinsky and Wang, 2006).

<sup>10</sup> Angrist and Pischke (2008) indicate that it is unlikely that a trace of the effects of instrumental variables on our outcome

sufficiently pre-determined with respect to current performance, which we have argued above is satisfied. In conjunction with the two-stage least squares estimation we conduct two tests regarding specification. The first is the Durbin-Wu-Hausman test of the null hypothesis that a potentially endogenous variable is exogenous (Durbin, 1954; De-Min, 1973; Hausman, 1978). The second is a test of the null hypothesis that the instrumental variables we use are only weakly correlated with the assumed endogenous variable (Staiger and Stock, 1997; Stock, Wright, and Yogo, 2002).

### 2.2.2 Control Variables

In all our regression specifications we control for firm size, firm age, bank borrowing, general leverage, default risk, and an indicator of accounting disclosure. Company size may be associated with the extent or lack of an agency problem. Williamson (1967, 1985) for instance suggests economies of scale and other related factors influence the size of the firm, but that decreasing returns to managerial efficiency, and span of control issues, may emerge in larger firms. Conversely, large firms may be those which have survived and grown due to operating efficiently. We control for the size of the firm using total assets. Older firms may be more efficient than younger firms and the fact that they have survived may suggest the agency costs for such firms are smaller. On the other hand, older firms may reflect situations where investment opportunities have been largely exhausted and excess cash flow permits greater abuse of resources. We therefore also control for firm age. We calculate firm age as the number of years between a company's incorporation date and a financial statement date.

In the absence of access to public equity markets, private firms rely on debt provided by owners and external institutions such as banks as their primary source of financing. For instance, Berger and Udell (2002) and Cole, Wolken, and Woodburn (1996) note that financial institutions provide roughly 27% of the dollar amount of small business credit in the US with an additional 16% coming from trade credit. The role of monitoring has long been recognized as an important ingredient of bank lending (Diamond, 1991; Tirole, 2006). Logically, a bank's monitoring incentives should be directly proportional to the level of loans they make to a firm. We include bank debt scaled by total assets as an independent variable. We also include total liabilities scaled by total assets, and the number of subsidiaries associated with a firm, as control variables; and account for whether the firm paid a dividend in the most recent year. Finally, we control for the likelihood of company failure in the subsequent year by including dummy variables for four of the five bands (high risk, caution, normal and stable) into which the Quiscore of a company falls, with the "secure" band as excluded group. These variables are collectively labeled "Firm Characteristics".

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variables is not discernible in the reduced (indirect) form. Therefore, we regress the outcome variables (AT, OPEX and EBITD) on the instrumental variables (instead of instrumented variables) directly and all the other variables. We find that the signs and significance of the coefficient estimates on instrumental variables are consistent with our main results.

### 3 Vertical and Horizontal Agency Costs in Private Firms

#### 3.1 Vertical Agency Costs

The central concern in discussions of vertical agency problems is that the separation of ownership and management increases the incentive of managers to consume corporate resources, and it dilutes their incentive to maximize company performance and value. In this first section on our empirical results, we start by re-testing three main results of Ang et al. (2000) for private firms, using our large selection-bias-free sample, and after duly controlling for endogeneity. Specifically, we examine three questions in this section. First, are agency costs higher in non-owner-managed firms when compared to owner-managed firms? Second, more generally, does greater managerial ownership reduce agency costs? And third, does an increase in the number of shareholders increase agency costs? The evidence in Ang et al. (2000) supports affirmative answers to each of these questions.

Firms where managers collectively own at least 99% of the firm are classified as owner-managed and are assumed to be free of any vertical agency problems. Non owner-managed firms constitute the rest of the sample and are taken to be associated with the presence of vertical agency problems. Table 2 Panel A presents univariate results using the full sample and a matched sample of private firms, with and without vertical agency problems. The matching criteria are: first, same two-digit industry; second, assets within a 30% range; and third, financial statements filed within 365 calendar days. Non-owner managed firms exhibit significantly poorer operating performance and efficiency relative to owner-managed firms – and hence clearly suffer from higher implied agency costs. On average, AT is 6% lower, OPEXP is 9% higher, and EBITD is 13% lower for non-owner managed firms relative to a size-and-industry matched sample of owner-managed firms. Ang et al. (2000) found comparable results for their U.S. sample: that, on average, AT is 9% lower and OPEXP is 11% higher for non-owner managed firms relative to owner-managed firms. They did not examine EBITD.

That said, it is possible that the ownership and management structures in private firms and agency problems are endogenously determined. Several observable factors such as firm size and age, and unobservable factors, may influence the choice of owner-managed versus non-owner-managed as well as the magnitude of agency problems. As discussed in Section 2.2.1 above, we tackle endogeneity by using a geography-based and an industry-based variable to instrument for ownership and management structures.

Panel B of Table 2 presents two-stage least squares estimation results to control for endogeneity. We define a dummy variable, *Vertical Agency Problem*, that equals 1 for firms associated with vertical agency problems (with or without any horizontal agency problems), and 0 otherwise. Firms with this dummy are not owner-managed. The two instruments we use are the proportion of non-owner-managed firms in the area covered by the first two characters of the company's headquarters zip code, and the proportion of non-owner-managed firms in the same two-digit SIC code. We control for firm

characteristics, and we include industry and year fixed effects in all our regressions all through the paper. The first stage regression with both instruments included is in column 2. The coefficients of the predicted variable in columns 3, 4, and 5, are each statistically significant and have the sign that would be predicted if owner-managed firms are associated with lower agency costs.<sup>11</sup> To avoid clutter, we do not report coefficient estimates on firm characteristics but indicate that such controls are present in the estimated models (Firm Characteristics).

Panels C of Table 2 presents instrumental variables (IV) regression results for the dependence of agency cost proxies on managerial ownership. The two instruments for managerial ownership (Panel C) are the average managerial ownership among firms at the two-digit SIC code level, and the average managerial ownership among firms in the area covered by the first two characters of the zip code. The coefficients of the predicted variable in columns 3, 4, and 5, are each statistically significant and have the sign that would be predicted if higher managerial ownership is associated with lower agency costs.

Panels D of Table 2 presents instrumental variables (IV) regression results for the dependence of agency cost proxies on the number of shareholders per firm. The two instruments for the number of shareholders per firm are the average number of shareholders per firm at the two-digit SIC code level, and the average number of shareholders per firm in the area covered by the first two characters of the zip code. The coefficients of the predicted variable in columns 3, 4, and 5, are again each statistically significant and have the sign that would be predicted if an increase in the number of shareholders is associated with higher agency costs.

Overall, our results reaffirm the earlier Ang et al. (2000) results using our large and selection-bias-free sample. We now go on to present the rest of our empirical results, each of which is new to the literature, and is being examined for the first time.

### **3.2 Horizontal Agency Costs: Unequal Ownership across Shareholders**

Horizontal agency costs in private firms arise when controlling shareholders extract private benefits of control, and thereby expropriate cash flows that otherwise might have been shared with minority shareholders (Dyck and Zingales, 2004; Gilson and Gordon, 2003; Roe, 2005; Laeven and Levine, 2008). Hence, such costs do not exist in single-owner firms or firms in which all co-owners have equal stakes. It is the unequal ownership across shareholders that creates a controlling shareholder, and the accompanying potential or incentive for expropriation of minority shareholders.<sup>12</sup> We accordingly examine overall horizontal agency costs by asking the following question: are agency costs higher in firms with unequal ownership across shareholders, relative to firms in which all shareholders have an

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<sup>11</sup> The test for exogeneity shows that the variable Owner-Managed can be treated as exogenous, but to be conservative we present only the two-stage regression results. Also, we are able to reject the null hypothesis of weak instruments.

<sup>12</sup> We exclude single-owner firms and only consider private firms with at least two shareholders in this section.

equal stake in the firm?

Table 3 Panel A presents univariate comparisons. Firms with unequal ownership exhibit, on average, significantly lower operating performance and efficiency relative to a size-and-industry matched sample of firms in which all owners have equal stakes. On average, their AT is 5% lower, OPEXP is 19% higher, and EBITD is 25% lower. The differences in both means and medians are statistically significant, and the results do not change when we use the full samples of firms with unequal and equal co-ownership to estimate the differences in our agency cost proxies.

Panel B of Table 3 presents two-stage least squares estimation results to control for endogeneity. We define a dummy variable, *Horizontal Agency Problem*, that equals 1 for firms associated with the presence of horizontal agency problems (with or without any vertical agency problems), and 0 otherwise. Firms in this group have unequal ownership stakes across owners, so that there is a dominant owner. The two instruments for presence of unequal ownership are *Prop\_Horizontal\_Industry* and *Prop\_Horizontal\_Area*, defined as the proportion of firms with unequal ownership at the two-digit SIC code level, and the proportion of firms with unequal ownership in the area covered by the first two characters of the zip code. The results of the first stage regression with both instruments included are in column 2. The coefficients of the predicted variable in columns 3, 4, and 5, are each statistically significant and have the sign that would be predicted if firms with unequal ownership are associated with higher agency costs.<sup>13</sup>

An investigation of overall horizontal agency costs is new since the existing literature on private firms in the context of the potential for expropriation of minority shareholders consists just of Nagar et al. (2011), who have focused narrowly just on the effect of the absence of majority control, which we consider later in Section 4. This investigation has significant policy relevance, given that unequal ownership, and hence the potential for the existence of these horizontal agency problems, is extensive and widespread. Table 1 shows that, in our main sample of 40,698 private firms, 83% of private firms are potentially subject to horizontal agency problems.

### 3.3 Relative Contributions of Vertical and Horizontal Agency Costs

Having established the negative impact of vertical and horizontal agency problems on company performance in isolation, each on their own, we now ask the following question: what is the comparative significance of vertical and horizontal agency problems in terms of loss of operating performance and efficiency, and what is the incremental impact of both vertical and horizontal agency problems being jointly present in the same firm?

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<sup>13</sup> The test for exogeneity shows that the variable Unequal Ownership can be treated as exogenous, but to be conservative we present only the two-stage regression results. Also, we are able to reject the null hypothesis of weak instruments.

We partition our sample firms into one of four different sub-samples based on the type of agency problem in the firm. These are shown in the four quadrants in Panel A of Table 4. The upper left quadrant contains the cases categorized as having no vertical or horizontal agency problems, while the lower right quadrant contains those cases in which both problems are present. The off-diagonal quadrants have firms which have one type of agency problem or the other, but not both. Panel A presents univariate statistics for each of our agency cost proxies AT, OPEXP, and EBITD. We use the conditional mean values of our agency cost performance proxies in the upper left quadrant as the benchmark values that corresponds to zero agency costs. The values in the other three quadrants also include percentage differences relative to the corresponding upper left quadrant values. We present the 2 x 2 table only for sub-samples that are matched on size and industry, but our qualitative inferences based on sub-samples that include all firms in the category remain unchanged. Figure 1 provides a pictorial representation of implied agency costs in different scenarios.

There are two important conclusions from Table 4 Panel A and Figure 1. The first is that the impact of horizontal agency costs is, on average, significantly higher than the impact of vertical agency costs in the firms in which they are present in isolation of the other. The second is that the presence of both horizontal and vertical agency problems leads to proportionately greater agency costs: the impact of a given level of horizontal and vertical agency problems appears significantly amplified when both are present in the same firm. However, these are just univariate results and do not control for endogeneity and firm characteristics, to which we now turn.

Panel B of Table 4 presents the results of instrumental variable regressions. In addition to the dummy variables *Vertical Agency Problem* and *Horizontal Agency Problem* described above, we define a third dummy variable, *Vertical & Horizontal*, that equals 1 for firms that exhibit both vertical and horizontal agency problems, and 0 otherwise. We treat these three dichotomous choice variables as potentially endogenous. The instrumental variables we employ are again based upon industry and geographic location. They are again defined as the proportion of firms corresponding to the *Vertical Agency Problem*, *Horizontal Agency Problem*, and *Vertical & Horizontal* classifications at the fiscal year and two-digit SIC code level, and the proportion of firms corresponding to the *Vertical Agency Problem*, *Horizontal Agency Problem*, and *Vertical & Horizontal* classifications in the area covered by the first two characters of the zip code. They are described in more detail in Appendix C. To avoid clutter in the Table, we only report the second stage estimation results.

The regression coefficients on *Vertical* and *Horizontal* respectively capture the impact of vertical and horizontal agency problems, and the regression coefficient on the interaction term *Vertical & Horizontal* captures the *incremental impact* of the presence of both vertical and horizontal agency problems in the same firm. Each of the regression coefficients on the variables *Vertical Agency Problem*, *Horizontal*

*Agency Problem*, and *Vertical & Horizontal* are clearly statistically significant for each of the agency cost proxies.

First, the regression coefficients show that the average impact of horizontal agency costs are relatively greater than the average impact of vertical agency costs. While the reduction in AT (relative to the base case of zero agency costs), arising from vertical and horizontal agency problems is similar in magnitude, the increase in OPEXP is about four times higher for horizontal agency problems relative to vertical agency problems, and the decrease in EBITD is about twice as much for horizontal agency problems relative to vertical agency problems.

Second, the joint presence of both horizontal and vertical agency problems in the same firm results in very significant amplification of overall agency costs for each of the agency cost proxies. On average, the joint presence increases OPEXP and decreases EBITD by an amount about equal to the effect of vertical agency problems on their own; and doubles the decrease in AT. An intuitive explanation for this negative synergy in overall total agency costs in the presence of both types of agency problems could be the following: (a) the unequal ownership across shareholders that creates a horizontal agency problem also means that there is likely a controlling shareholder, who could even be a dominant shareholder; (b) the controlling shareholder would arguably be instrumental in the appointment of the team of key managers; (c) the incentives of the management team would then be aligned with the interests of the controlling shareholder, and (d) that may exacerbate both, the managerial consumption of corporate resources on one hand, and the expropriation from minority owners on the other.

We undertake a similar analysis separately for the private firms in each of our four size quartile samples (results not reported for the sake of brevity). While the relative magnitudes of the coefficients are, as expected, not the same in each quartile, our qualitative inferences remain exactly the same as they are for the whole sample: (a) first, the impact of horizontal agency problems dominates that of vertical agency problems in each quartile and for each agency cost proxy; and second, (b) the joint presence of vertical and horizontal agency problems in the same firm significantly amplifies the impact of these agency problems.

We can also use our inference on the relative significance of vertical and horizontal agency, whether acting alone or jointly, to build a more complete economic picture about the loss in performance due to agency problems. Figure 1 provides, for AT, OPEXP, and EBITD respectively, the loss in performance for firms with vertical agency problems alone, horizontal agency problems alone, and both horizontal and vertical agency problems jointly present. Furthermore, for the case of firms in which both types of agency problems are present, the figure provides a three-way decomposition of the loss in performance attributable to vertical agency problems alone, horizontal agency problems alone, and the amplification effect of both horizontal and vertical agency problems being jointly present.



## 4 Contestability in Control

Horizontal agency costs should arguably be lower when there is contestability in the control of a firm, arising, for example, because of the presence of a sufficiently large and influential non-controlling shareholder who can effectively monitor and push back on decisions of the controlling shareholder that are not in the best interests of minority owners. Other things equal, such contestability in control should also be greater when the controlling shareholder does *not* have majority control. In this section, we test whether and how contestability in control through the presence of a second large shareholder, and the absence of majority control, mitigates horizontal agency costs by effectively constraining expropriation by controlling shareholders.

The exploitation by the controlling shareholder of minority shareholders should clearly be greater when the controlling shareholder has majority ownership of more than 50% of the firm's shares, in which case there may be no compelling need for the controlling shareholder to share control with minority owners, and hence, there is a greater likelihood of her extracting private benefits at the expense of these minority shareholders.<sup>14</sup> When the controlling shareholder does not own more than 50% of the firm's shares, she can still extract private benefits of control, particularly when the minority shareholders are not large enough to have any reasonable influence on decision-making. Expropriation by the controlling shareholder should be relatively less only when there is greater concentration of ownership among non-controlling shareholders (Pagano and Roell, 1998), and where the difference in the stakes of the controlling shareholder and that of the second largest shareholder is small (Bloch and Hege, 2003).

The data in Nagar et al. (2011) only indicated whether or not there was majority control, but not the other details of ownership structure that would allow inferring the extent of "contestability" in the control exercised by the controlling shareholder. Nagar et al. (2011) accordingly just examine the effect of whether the controlling shareholder owns more or less than 50% of the firm. We investigate the effect of contestability of control more generally by examining the effect of a second large shareholder and of majority control separately, and then the effect of a second large shareholder, conditional on the presence or absence of majority control. We use the ownership stake of the second largest shareholder as our measure of the influence of the second largest shareholder.<sup>15</sup>

Panel A of Table 5 presents results of univariate two-sample analysis of mean values for sub-samples of firms sorted on the basis of two indicator variables – the ownership stake of the second largest shareholder, and the presence of majority control. For each pairwise comparison, we use sub-samples that are matched by firm size and industry, and test whether the pair-wise difference in means is statistically

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<sup>14</sup> For evidence consistent with this view, please see: Morck et al. (1988); LaPorta, Lopez-de Silanes, and Shleifer (1999); and Dyck and Zingales (2004).

<sup>15</sup> We also repeat the analysis using the difference in ownership stakes of the top two shareholders as our measure of the influence of the second largest shareholder, and our results remain qualitatively unchanged.

significant. Our results, even with a simple comparison of averages, are clear and strong.

First, each of our agency cost proxies based on reduction in operating performance and efficiency (lower AT, lower EBITD, and higher OPEXP) show that, relative to firms in the lowest quartile by ownership stake of the second largest shareholder (*i.e.*, *Weak Second Shh*), agency costs are significantly lower for firms in the corresponding highest quartile (*i.e.*, *Strong Second Shh*). This is irrespective of whether the controlling shareholder has majority control or not, though the mitigation in agency costs due to the presence of a strong second shareholder is significantly greater in firms without majority control.

Second, agency costs are, on average, significantly higher in firms with majority control of a controlling shareholder but this effect seems to be driven by firms with weak second largest shareholder.

Third, whether we look at the univariates over matched paired samples of all firms, or matched paired sub-samples, the differences in the agency cost proxies between the sub-samples of firms with weak and strong second shareholder is an order of magnitude higher than the corresponding differences between the sub-samples of firms with and without majority control. The agency cost mitigation impact of the second largest shareholder is considerably stronger than that of the absence of majority control.

Table 5 Panel B reports corresponding results based on instrumental variable regressions that control for endogeneity, firm characteristics, industry fixed effects, and year fixed effects. The dummy variable *Majority Control* takes the value 1 for firms where the largest shareholder's stake is more than 50%, and 0 otherwise. The variable *Second Largest Shh* is the ownership stake of the second largest shareholder. To account for the possibility that *Majority Control* and *Second Largest Shh* could be endogenous we define two instruments for each of them. The proportion of firms with majority control at the fiscal year and two-digit SIC code level, and in the area covered by the first two characters of the zip code are used as instruments for the presence of majority control. Average values of the second largest shareholder's stake at the fiscal year and two-digit SIC code level, and in the area covered by the first two characters of the zip code are used as instruments for the second largest shareholder's stake. We report only second stage results. These are in columns 2 to 4 for *Majority Control* on its own, in columns 5 to 7 for *Second Largest Shh* on its own, and in columns 8 to 10 with a specification that includes both *Majority Control* and *Second Largest Shh*.

In Table 5 Panel B, when we run just *Majority Control* on its own, each of the agency cost proxies show greater agency costs, but statistical significance is only at the 10% level for AT and OPEXP.<sup>16</sup> With just *Second Largest Shh* on its own, all measures again become significantly worse as one would expect,

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<sup>16</sup> Nagar et al. (2011) examine just majority control, and their results for their majority control variable (reported in their Table 6) are qualitatively consistent with our regression results that include just majority control. Their coefficients, like two of ours, are also significant just at the 10% level. It is difficult to meaningfully compare and interpret the regression coefficients themselves, given that the control variables and instrumental variables are different in our case.

but the coefficients are an order of magnitude larger, and statistically highly significant. In the presence of both *Second Largest Shh* and *Majority Control*, the variable *Second Largest Shh* continues to have similarly high coefficient values and high statistical significance, but the *Majority Control* variable loses statistical significance for OPEXP and EBITD, and it remains only marginally significant at 10% level for AT. Clearly, the inferences we summarized on the basis of simple univariate analysis of matched samples do not change.

Table 5 Panel C again reports results based on instrumental variable regressions that control for endogeneity, firm characteristics, industry fixed effects, and year fixed effects; but here we use regression specifications based on multiplicative dummy variables. Columns 2 to 4 report the results of second stage regressions in which *Second Largest Shh* is one independent variable, and *Second Largest Shh* multiplied by the dummy variable *Majority Control* is another. As before, *Second Largest Shh* signals highly significant mitigating impact on agency costs irrespective of the measure used, but the extent of impact is not significantly changed by *Majority Control* for OPEXP and EBITD, and it is changed only at a marginal level of significance for AT. Columns 5 to 7 report the results of second stage regressions in which *Majority Control* is one independent variable, and *Majority Control* multiplied by two other dummy variables are two other independent variables. These two dummy variables correspond to *Second Largest Shh* being in the highest and lowest quartiles. Columns 5 to 7 shows that *Majority Control* on its own is not significant, and the absence of *Majority Control* significantly reduces agency costs by all three measures only when *Second Largest Shh* is in the highest quartile and not otherwise. Again, the inferences we summarized on the basis of simple univariate analysis of matched samples do not change.

## 5 Corporate Co-Ownership of Private Firms

In this section, before we transition to public firms in Section 6, we undertake an exploratory examination of agency costs in private firms with more complex ownership structures. Specifically, we examine private firms jointly owned by corporate entities and individuals/families, relative to private firms owned entirely by individuals/families. Such firms are about 11% of our sample, and these firms are comparable along multiple dimensions with firms owned entirely by individuals/families. Co-ownership by corporate entities alongside individuals/families arguably creates relatively more complex monitoring incentives and frameworks that could potentially distort the monitoring influence of both the individual/families as well as these corporate entities. The motivation for this analysis also arises in the context of Jensen (1989), together with the increasing use by young firms, and for longer periods of time, of private (rather than public) markets to raise capital (Doidge et al. 2018), and the influence of private equity firms.

Table 6 Panel A presents univariate comparisons of our agency cost proxies for samples of firms (matched by size and industry) jointly owned and not-jointly owned by corporate entities. Each of our

agency cost proxies indicates significantly higher agency costs for firms co-owned by corporate entities. Firms jointly owned by corporate entities have 7% lower AT, 33% higher OPEXP, and 56% lower EBITD compared to firms owned entirely by individuals/families.

Table 6 Panel B presents two-stage least squares estimation results treating the dichotomous choice of a joint ownership with a corporate entity as potentially endogenous. As before, we define the instruments *Prop\_Jointly\_owned\_Area* and *Prop\_Jointly\_owned\_Industry* as the proportion of firms jointly owned at the fiscal year and two-digit SIC code level, and the proportion of firms jointly owned in the area covered by the first two characters of the zip code. The test for exogeneity leads to the inference that the *Jointly Owned* variable can be treated as exogenous, and we are again able to reject the null of weak instruments. The coefficients of the second stage regressions in columns 3, 4, and 5 are each statistically significant with the sign that would be predicted if firms jointly owned by corporate entities are associated with higher agency costs.

## 6 Agency Costs in Private vs. Public Firms

This section presents the results of empirically examining the following question: are agency costs higher in private firms relative to publicly traded firms? Theory suggests that the answer should be ‘no’. The rationale for this expectation arises because the incentives of shareholders to monitor managers increase as their numbers decrease or their ownership stakes increase (in the context of Jensen and Meckling, 1976); and also because, as highlighted by Bhidé (1993), the ready liquidity provided by the option of public trading makes it easy and potentially less costly for unhappy shareholders to just exit the firm rather than expend monitoring resources. As discussed in the introduction, existing research has focused only on specific aspects of agency costs (Edgerton, 2012); Asker et al., 2015), or it is tangential and lacks power since it is based on industry groups rather than individual firms (Cooper and Priestley, 2016).

Private firms vastly outnumber public firms in our sample and there are significant differences in size and other characteristics between these two groups of firms (see Table 1). We therefore match each public firm-year observation with private firm-year observations belonging to the same fiscal year, two-digit SIC code and with total assets within 30% of the treatment observation. Among the matches, we then identify a private firm-year observation with the closest QuiScore and total debt to the treatment public company. Matching is done with replacement. We identified matches for 5,163 out of the 6,156 firm-year observations for public firms. The characteristics of these matched samples are in Table 7 Panel A. Our univariate and multivariate test results are based on these matched samples. The results therefore allow us to focus on the intrinsic differences between very similar public and private firms.

Table 7 Panel A presents the results of univariate tests of the null hypothesis that the mean (median) of paired differences for each performance measure equals zero using t-tests and Wilcoxon sign rank

tests. The results unequivocally indicate that, for each of the three measures, public firms are associated with considerably and significantly higher agency costs compared to private firms. In public firms, the median value of AT is about 10% lower, that of OPEXP is about 35% higher, and that of EBITD is about 29% lower, relative to the matched sample of private firms.

Table 7 Panel B presents instrumental variables regression analysis controlling for endogeneity. It is possible that the corporate structure choice of private versus public is jointly determined with our measures. We therefore specify and estimate a linear model using two-stage least squares estimation. We use two instrumental variables to account for potential endogeneity. First, given that public company headquarters tend to cluster (see for example, Figure 1 in Loughran (2008)), *Prop\_Public\_Area* is specified as the proportion of public firms headquartered in a given geographical unit defined as the area encompassing the first two characters of the zip code of a company's headquarter's location. Second, *Prop\_Public\_Industry* is specified as the proportion of public firms at the fiscal year and two-digit SIC code level.<sup>17</sup>

Column 2 of Table 7 Panel B presents the first stage regression in which the choice variable is public or private (1 for public and 0 for private) and we include both instrumental variables, in addition to the control variables for firm characteristics, industry fixed effects, and year fixed effects. Columns 3, 4, and 5 present the second stage estimation results using the predicted variables from the first stage model where the dependent variables are AT, OPEXP, and EBITD respectively. The coefficients of the second stage regressions in columns 3, 4, and 5 are each statistically significant with signs that show that, after accounting for endogeneity as we have, public firms have significantly lower AT, significantly higher OPEXP, and significantly lower EBITD.<sup>18</sup>

Our finding that agency cost proxies are significantly higher in our large and reasonably comprehensive sample of public firms relative to comparable private firms functioning within the same accounting and legal regimen, is new to the literature, and it has significant policy-level relevance. Hypothetically, as an example, if all publicly traded firms in our sample year 2006 were organized as private companies, and nothing else changed, the savings in operating expenses would have been about GBP 10 billion annually, equivalent to about 0.7% of U.K. GDP that year.

<sup>17</sup> In unreported results we include another instrument  $\text{Log}(\text{Distance})$ , the log of the distance between a company's U.K. headquarters and London.  $\text{Log}(\text{Distance})$  can be potentially motivated by evidence that proximity to a financial center has been found to facilitate access to public capital markets and therefore the likelihood of a company being public. For instance, Saunders and Steffen (2011) use distance from London as an instrument for public versus private status of U.K. firms. The results reported in Table 7 are largely unchanged.

<sup>18</sup> The last two rows of Panel B present the p-values for the Durbin-Wu-Hausman exogeneity test and the weak instrument test proposed by Staiger and Stock (1997) and Stock et al. (2002). The exogeneity test does not reject the null hypothesis that *Public* is an exogenous variable in the AT model specifications. However, the null is rejected for the OPEXP and EBITD models. To be conservative we estimate and report two-stage least squares models for each agency cost specification. The null hypothesis of weak instruments is consistently rejected in each case.

## 7 Robustness Tests

### 7.1 All Companies Filing Reports

In all our earlier tables, we had hitherto restricted our sample firms to those that are required to follow the full reporting and auditing requirements of the U.K. Companies House with no exemptions whatsoever. Some small and medium sized companies can claim exemptions from either or both of these requirements, and some are also allowed to file abridged financial statements. We had earlier excluded all such firms. As a robustness check, we repeat all our tests using our full sample of over 200,000 firms and 500,087 firm-years. We find that our bottom-line findings are totally robust to the inclusion of these small private firms. For brevity, we present in Table 8, only a replication of an important earlier Table, Table 4, documenting horizontal and vertical agency problems in private firms, classifying firms in four categories: a base case of firms with no horizontal and vertical agency problems, firms with only vertical agency problems, firms with only horizontal agency problems, and firms with both horizontal and vertical agency problems present in the same firm. As is clear from Table 8, our inferences remain qualitatively unchanged from what they were earlier.

### 7.2 Tests Based Upon Abnormal Executive Compensation

We would ordinarily expect firms associated with the absence of vertical and horizontal agency problems to set managerial compensation no greater than what would be expected after controlling for economic determinants of the level of executive compensation. However, in contrast, agency problems could manifest as abnormal positive deviations of actual compensation from what would otherwise be normal. Core, Holthausen, and Larcker (1999), Hartzell and Starks (2003), Almazan, Hartzell, and Starks (2005) and Conyon, Core, and Guay (2011) present evidence suggesting that CEOs earn greater compensation when governance structures are less effective.

We rely on extant theory and empirical work as a basis for identifying variables that are predicted to determine the normal level of compensation for a firm (for example, Core et al., 1999; Smith and Watts, 1992; Conyon et al., 2011). We proxy for firm size and complexity with total assets. We proxy for investment opportunities using the lagged sales growth rate as data required to calculate market valuation measures are unavailable for our sample of private firms. We proxy for past performance with change in operating profit scaled by assets. We also control for leverage, payout policy, industry and time effects. We follow the spirit of Hartzell and Starks (2003) and regress the natural logarithm of executive compensation on the variables just mentioned and our proxies for weak governance structures. The instrumental variables used to account for endogeneity are described in Appendix C. Again, for brevity we only report second stage regressions for these variables.

Table 9 reports regression results in which our dependent variable is the natural log of compensation. The positive and significant coefficients on *Vertical Agency Problem* and *Horizontal Agency Problem* in columns 2, 3, and 4 respectively show that executive compensation is significantly higher in firms with vertical agency problems on their own, in firms with horizontal agency problems on their own, and in firms with vertical and horizontal agency problems present together. Furthermore, horizontal agency problems having a marginally greater influence than vertical agency problems in private firms. These results are consistent with the results presented earlier based upon AT, OPEXP and EBITD.

In the context of Jensen and Murphy (1990), we also examine whether the presence of agency problems influences the relative sensitivity of executive compensation to changes in operating performance. We create interaction variables *Vertical Agency Problem\*ΔOp.Profit* and *Horizontal Agency Problem\*ΔOp.Profit*, and we include them as additional explanatory variables in the earlier regression specification. The coefficient estimates on the interaction variables measure the incremental effect of the presence of agency costs on the pay-for-performance sensitivity of executive compensation. Column 5 of Table 9 reports the results. The negative and significant estimates of the coefficients on the above interaction variables indicate lower pay-for-performance sensitivity associated with both vertical and horizontal agency problems, relative to firms without these agency problems. Again, the result is consistent with the results presented earlier based upon AT, OPEXP and EBITD.

## 8 Overall Economic and Public Policy Implications<sup>19</sup>

### 8.1 Economic Implications

In this section, we provide order-of-magnitude back-of-the-envelope estimates of the absolute magnitude of dollar losses corresponding to the reduction in performance and efficiency in ownership structures potentially associated with agency problems. In other words, we estimate the absolute dollar value of implied overall agency costs for the U.K. economy as a whole during a sample year, and an extrapolated projection for the U.S. and the global economy today. Our estimate is based on two variables – incremental operating expenses and the incremental loss in aggregate earnings – both of which provide a dollar value for the losses likely attributable to agency problems.

While our estimates are far from perfect, it is possible for us to even venture to make these overall dollar value estimates is because of three main reasons. First, we have a large and reasonably *comprehensive* sample covering almost *all* eligible firms in the U.K. economy based on any chosen criteria. Second, our measures are based on actual performance and cash flows (rather than highly volatile market prices). And third, our estimates of incremental agency costs – measured by differences in

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<sup>19</sup> We warmly thank an anonymous referee for suggesting greater focus on the economic and public policy implications of our results.

operating expenses and earnings performance – are based on samples that have been duly matched by size and industry, and anchored ultimately in the operating expenses and earnings performance of a base-case sample of firms with arguably no vertical and horizontal agency costs, i.e., owner-managed firms with equal ownership across multiple owners.<sup>20</sup>

Figures 2.1, 2.2, 2.3, and 2.4 provide an overview of overall economic implications for the U.K. economy as a whole. They are based on our full sample of 107,535 private and public firms covered by our database for the fiscal year 2006. Less than 2% of the book value of total assets was in firms with no horizontal or vertical agency problems, with 57.5% in public companies, 29% in private firms with both horizontal and vertical agency problems, 10.5% in private firms with only vertical agency problems, and only 1% in private firms with only horizontal agency problems.

More importantly, the total estimated incremental annual operating expenses attributable to agency problems across all firms are an astronomical GBP 82.1 billion for 2006, which was 5.6% of the U.K. GDP that year (Figure 2.3). The incremental annual operating expenses in private firms associated with only vertical agency problems, and those in private firms associated with only horizontal agency problems, were each relatively minuscule at about one billion pounds each, corresponding to about 0.1% of GDP each. However, the incremental annual operating expenses in private firms associated with both vertical and horizontal agency costs were large at GBP 27 billion annually, or 1.8% of U.K. GDP that year; and those in publicly traded firms were about double that at GBP 53.1 billion annually, or 3.6% of U.K. GDP that year. The figures estimated as a proportion of GDP are clearly not necessarily extrapolatable to the U.S. and the global economy today; but if they were, they would imply overall incremental annual operating expenses attributable to agency costs of about \$1 trillion dollars for the U.S. economy in 2019, and over \$4 trillion dollars for the global economy.

The estimates based on loss in earnings in firms with agency problems are also very large and economically highly significant. These losses are relatively minuscule in private firms associated with only vertical agency problems or only horizontal agency problems, but are very large – GBP 15.3 billion loss of earnings in 2006 – in private firms associated with both vertical and horizontal agency problems; and about double that – GBP 30.4 billion loss of earnings in 2006 – in U.K. publicly traded firms. The overall loss in aggregate earnings was therefore about GBP 47 billion in 2006, or about 3.2% of U.K. GDP that year. These are figures for a single year. If we assume a relatively conservative value to earnings multiple of 10, that would have corresponded to almost half a trillion pounds sterling in enterprise value for the U.K. in 2006.

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<sup>20</sup> Earlier papers focused on agency costs in public firms do not have data on private companies to be able to provide such an estimate. Neither Ang et al. (2000) nor Nagar et al. (2011) are able to provide a credible estimate of overall agency costs in the economy as a whole because their data set (a) includes relatively few firms that are not randomly selected, (b) has very limited ownership information, and, (c) does not include publicly traded firms.



## 8.2 Public Policy Implications

Agency problems are unavoidable in large firms that need significant funding, or the specialized skills and innovative abilities of multiple shareholders or managers. However, public policy and regulation can be structured to incentivize mitigation of these problems and their associated economic costs. While we leave a detailed discussion of policy prescriptions for future scholarship, it bears mention our conclusions in relation to each of our contributions have significant public policy implications.

First, our results show that, for multi-owner private firms, agency problems arising from unequal ownership across owners are very significant, and greater in their impact than the agency costs arising just from separation of owners and managers. Hence, incentives for equality of ownership across shareholders in multi-owner private firm should clearly be helpful. Second, given our result on the significant amplification of overall agency costs that results from the interactive joint presence of both horizontal and vertical agency problems in the same firm, it may be helpful to incentivize appointment of top-ranking managers from among the shareholder group for firms that have unequal ownership across shareholders. Third, given our finding that horizontal agency costs are significantly mitigated by the presence of a second shareholder with a large ownership interest alongside the controlling shareholder, there is a strong case for incentives to promote contestability in control. Finally, we show that agency costs in public firms are significantly higher than in comparable private firms (matched by size and industry). In the context of the distinctive feature of publicly traded firms – that shareholders have the option to easily “exit” through public trading rather than exert influence through “voice” based governance mechanisms – it is helpful to put in place corporate governance regulation and practice that more efficiently incentivizes and empowers shareholders in public companies to play an effective role in monitoring of their managers.

## 9 Concluding Remarks

Agency theory differentiates between vertical and horizontal agency problems. Vertical agency problems arise when managers of a firm have incentives to use or consume resources in a manner that is at odds with the objectives of the firm’s owners. Horizontal agency problems arise when a controlling owner has incentives to exploit minority co-owners. Horizontal agency problems can be particularly severe in private companies. Both problems potentially contribute to a reduction in company performance and value, i.e., to associated agency costs.

More than 99% of firms, including the vast majority of firms employing more than 500 employees, are privately owned. Yet, except for Ang et al. (2000), Bitler et al. (2005), and Nagar et al. (2011) – who use a sample of private companies to examine, respectively, selected aspects of vertical agency problems on their own and the specific horizontal agency problem created by majority control – earlier studies have

focused exclusively on agency costs in publicly traded companies and on measures based on market prices. This study presents the first empirical investigation of the individual and comparative significance of vertical and horizontal agency problems in private firms, and the incremental impact of the joint presence of both types of agency problems in the same firm. It is also the first empirical comparison in this regard of publicly traded firms with matched private firms. Our agency cost proxies are not based on market price related measures, but on associated losses of enterprise cash flows, earnings, and operating efficiency. Importantly, our main results are based on an exceptionally large multi-year dataset that is cross-sectionally comprehensive, i.e., without selection biases, and contains information on the ownership and management arrangements of about 42,000 firms, covering the full spectrum from owner or non-owner managed single or multiple owner private firms, through to widely held publicly traded companies.

We analyze several important questions that are being addressed in the literature for the first time.

1. *Are agency costs higher in private firms that have unequal ownership across shareholders, and hence the potential for expropriation of minority shareholders? Our answer is yes.*
2. *Does the joint presence of both horizontal and vertical agency problems in the same private firm result in amplification of overall agency costs beyond the level that would exist based on just horizontal or vertical agency problems existing on their own? Our answer is yes.*
3. *Are agency costs higher in private firms with complex ownership structures created through joint ownership by corporate entities and individuals/families, relative to firms with just individuals/families as shareholders? Our answer is yes.*
4. *Does contestability in control as reflected in the presence of a second large shareholder (alongside the controlling shareholder) help reduce agency costs in private firms? Our answer is yes. The mitigation is greater in firms without majority control of the controlling shareholder, but significant also when the controlling shareholder has majority control.*
5. *Are agency costs higher in public firms when compared to private firms duly matched by size and industry, and subject to the same accounting and legal regimen? Our answer is yes.*

In addition, we provide large and selection-bias-free sample re-affirmation of earlier results of Ang et al. (2000) in relation to the following questions: *Are agency costs higher in non-owner-managed private firms relative to owner-managed private firms, lower when managerial ownership is higher, and higher for greater number of shareholders? Our answers, consistent with Ang et al. (2000), are yes in each case.*

Each of our conclusions represent statistically and economically significant inferences, not just from univariate matched sample comparisons, but also both OLS and two-stage instrumental variable regressions that control for endogeneity, firm characteristics, and year-fixed effects. Our conclusions are also robust to using multiple agency cost proxies, and they remain robust also over a much larger dataset of about 200,000 firms.

Overall, we estimate that the annual estimated losses in earnings and the annual incremental annual operating expenses attributable to agency problems across all firms are huge in economic terms: over 3% and over 5% respectively of U.K. GDP in a sample year. Our new results have significant normative policy implications in relation to how ownership structures and management arrangements might optimally be organized for controlling agency problems in both public and private companies. We leave a fuller discussion of these and other issues for future work.

## Appendix A: Identification of the sample

Data are obtained from periodic releases of the FAME database (produced by *Bureau Van Dijk*) dated October 2005, October 2006, November 2007, October 2008, October 2009 and October 2010.

**Notes for Table A.1:** The total number of firm-years in row 1 is 1,332,576. After applying the screening criterion explained in rows 2, 3 and 4 there are 1,299,704 firm-year observations (total from row 4).

**Notes for Tables A.2 and A.3:** We extract ownership data from these releases and apply several screening criteria. After the initial screening, there are 914,318 firm-year observations (total from row 3 in Table A.2). We further classify these firms into different groups based on the complexity of ownership structure (Table A.3). We lose more observations in this process for reasons including unclear ownership names, ownership stakes accounting for more than 100% etc. The total number of observations in Table A.3 across all rows and columns is 869,113.

**Notes for Table A.4:** We merge the firm-years in Table A.3 with those in Table A.1. Furthermore, we exclude firms in the financial and utility industries and exclude firms with turnover less than £50,000 as many data points are missing for firms smaller than this size threshold. The total number of observations across all rows and columns in Table A.4 is 500,087.

**Notes for Table A.5:** We retain firms that are not exempted from the reporting requirements of the Companies House. This restriction results in our final sample of 109,534 firm-year observations (total across all rows and columns in Table A.5).

Update	2005	2006	2007	2008	2009	2010
Table A.1: Initial screening criteria for company selection						
1. Extract firms with minimum assets of \$5,000 and Min. Sales of \$1,000 and classified as Private limited, Public AIM, Public Quoted OFEX, Public, Not Quoted and Public, Quoted:	35,463	280,728	279,270	269,060	246,039	222,016
2. Retain firms without missing SIC codes:	34,413	278,991	275,976	263,520	240,466	217,256
3. Retain firms with following account types: Full accounts, Group, Medium Company, Partial Exemption, Small company, Total exemption Full, Total Exemption Small	34,329	278,270	274,074	261,753	238,936	216,594
4. Retain sample period to fiscal year 2002 and above:	32,008	277,466	273,677	261,370	238,779	216,404
Table A.2: Identifying and initial clean-up of ownership data						
1. Extract firms with lagged ownership data:	51,765	280,593	279,110	268,971	245,948	221,846
2. Retain stand-alone firms (i.e., firms without holding companies):	18,375	222,109	217,770	208,176	185,711	160,314
3. Retain firms without missing shareholder names:	15,100	195,858	195,383	188,813	169,080	150,084
Table A.3: Further clean-up and classification of ownership data from Table A.2:						
1. Private firms owned by one individual	1,066	56,571	59,904	59,146	52,156	45,919
2. Private firms owned by one family	2,167	56,256	55,644	51,739	43,570	37,251
3. Private firms owned by multiple families	3,261	50,438	57,313	54,078	43,753	39,002
4. Private firms owned by individuals and companies	4,059	16,570	19,532	20,863	16,138	14,844
5. Public Firms	1,010	1,421	1,557	1,431	1,255	1,199
Table A.4: Sample of firms remaining after merging ownership data and financial information						
1. Private firms owned by one individual:	533	32,789	27,893	28,926	25,483	24,869
2. Private firms owned by one family:	1023	27,599	32,883	33,545	25,797	25,014
3. Private firms owned by multiple families:	1,847	25,132	33,041	34,863	22,809	22,855
4. Private firms owned by individuals and companies:	2,678	13,685	14,706	17,965	9,656	8,340
5. Public Firms:	458	1,052	1,266	1,201	1,090	1,089
Table A.5: Sample of firms that are not subject to exemptions from Companies House auditing and reporting requirements (sample used in our analysis)						
1. Private firms owned by one individual	523	1,859	1,891	1,963	1,657	1,755
2. Private firms owned by one family	979	2,410	3,223	3,366	2,263	2,838
3. Private firms owned by multiple families	1,799	5,038	7,600	8,910	4,625	5,322
4. Private firms owned by individuals and companies	2,452	9,351	9,770	12,401	6,178	5,205
5. Public Firms	458	1,052	1,266	1,201	1,090	1,089

## Appendix B. Variable definitions

Variable Name	Definition
Assets	Total assets, measured in thousands
AT	Asset turnover ratio defined as total revenues scaled by total assets
Available Stake	Total ownership stake that could be accounted for
Bank Debt/Assets	Bank loans outstanding scaled by total assets
Bank Loan (0/1)	Dummy variable that equals 1 if the firm has a loan from bank and zero otherwise
Dividend (0/1)	Dummy variable that equals 1 if the firm pays dividend and zero otherwise
EBITD	Earnings before interest, tax, depreciation and amortization scaled by total assets
Executive Compensation	Aggregate compensation of all executives (in thousands)
Firm Age	Firm age measured in years from date of incorporation to statement date
Firm Characteristics	Natural logarithm of total assets, firm age, bank loan, total liabilities/total assets, number of subsidiaries, dividend, a dummy variable <i>group</i> that equals to 1 if group accounts are filed and zero otherwise, and financial distress controls
Financial Distress Controls	Dummy variables <i>stable band</i> , <i>normal band</i> , <i>caution band</i> and <i>high risk band</i> that equal 1 if the Quiscore of the company falls between 60-80, 40-60, 20-40 and below 20 respectively.
Horizontal Agency Problem (0/1)	Dummy variable that equals 1 for firms with unequal ownership stakes among owners and zero otherwise.
Industry Fixed Effects	Dummy variables corresponding to the two-digit SIC codes
Jointly Owned (0/1)	Dummy variable that equals 1 for firms jointly owned by individuals and corporations and zero otherwise
Largest Stake	Ownership stake of the largest shareholder
Majority Control (0/1)	Dummy variable that equals 1 if the largest shareholder's ownership stake is greater than 50% and 0 otherwise
Managerial ownership	Total ownership stake of managers
No of Shh	Total number of shareholders
Op. Profit	Operating profit scaled by total assets
Public (0/1)	Dummy variable that equals 1 for public firms and zero otherwise
Sales Growth	One-year growth rate in sales
Second Largest Stake	Ownership stake of the second largest shareholder
Strong Second Shh	Dummy variable that equals 1 for firms in the fourth quartile of second largest shareholder's ownership stake and zero otherwise.
Total Debt/Assets	Total debt scaled by total assets
Total Liabilities/Assets	Total liabilities scaled by total assets
Vertical Agency Problem (0/1)	Dummy variable that equals 1 for firms associated with the presence of vertical agency problem and zero otherwise.
Vertical & Horizontal (0/1)	Dummy variable that equals 1 for the presence of both vertical and horizontal problems and zero otherwise.
Qui Score	Quiscore, produced by CRIF Decision Solutions Ltd., is a measure of the likelihood of company failure in the year following the date of calculation. In determining a Quiscore value for a company, a number of separate calculations are performed using various combinations of financial characteristics including turnover (revenue), pre-tax profit, working capital, intangibles, cash and bank deposits, creditors, bank loans and overdrafts, current assets, current liabilities, net assets, fixed assets, share capital, reserves and shareholders' funds.
Weak Second Shh	Dummy variable that equals 1 for firms in the first quartile of second largest shareholder's ownership stake and zero otherwise.

## Appendix C: Instruments for two-stage least squares models

**Table 2: Vertical agency problem in private firms**

1. Instrumented Variable: Vertical Agency Problem  
Instruments:
  - a. *Prop\_Vertical\_Area*: Number of firms associated with the presence of vertical agency problem divided by total number of firms in the area covered by the first two characters of the zipcode.
  - b. *Prop\_Vertical\_Industry*: Number of firms associated with the presence of vertical agency problem divided by total number of firms that share the same two-digit SIC code as the focus firm.
  
2. Instrumented Variable: Managerial Ownership  
Instruments:
  - a. *Avg\_MgrOwn\_Area*: Average managerial ownership per firm in the area covered by the first two characters of the zipcode.
  - b. *Avg\_MgrOwn\_Industry*: Average managerial ownership per firm that share the same two-digit SIC code as the focus firm.
  
3. Instrumented Variable: Number of Shareholders  
Instruments:
  - a. *Avg\_ShH\_Area*: Average number of shareholders per firm in the area covered by the first two characters of the zipcode.
  - b. *Avg\_ShH\_Industry*: Average number of shareholders per firm among firms that share the same two-digit SIC code as the focus firm.

**Table 3: Horizontal agency problem in private firms**

1. Instrumented Variable: Horizontal Agency Problem  
Instruments:
  - a. *Prop\_Horizontal\_Area*: Number of firms associated with the presence of horizontal agency problem divided by total number of firms in the area covered by the first two characters of the zipcode.
  - b. *Prop\_Horizontal\_Industry*: Number of firms associated with the presence of horizontal agency problem divided by total number of firms that share the same two-digit SIC code as the focus firm.

**Table 4: Horizontal and vertical agency problems in private firms**

1. Instrumented Variable: Vertical Agency Problem  
Instruments: See description for Table 2.
  
2. Instrumented Variable: Horizontal Agency Problem  
Instruments: See description for Table 3
  
3. Instrumented Variable: Vertical & Horizontal  
Instruments:
  - a. *Prop\_Vertical\_Area*: Number of firms associated with the presence of both vertical and horizontal agency problems divided by total number of firms in the area covered by the first two characters of the zipcode.
  - b. *Prop\_Vertical\_Industry*: Number of firms associated with the presence of both vertical and horizontal agency problems divided by total number of firms that share the same two-digit SIC code as the focus firm.

**Table 5: Horizontal agency problem in private firms: Role of majority control and second largest shareholder**

1. Instrumented Variable: Majority Control  
Instruments:
  - a. *Prop\_MajorityControl\_Area*: Number of firms with majority control (i.e., ownership stake of largest

shareholder is greater than 50%) divided by total number of firms in the area covered by the first two characters of the zipcode.

b. *Prop\_MajorityControl\_Industry*: Number of firms with majority control (i.e., ownership stake of largest shareholder is greater than 50%) divided by total number of firms that share the same two-digit SIC code as the focus firm.

2. Instrumented Variable: Second Largest Shh

a. *Avg\_SecondShh\_Area*: Average ownership stake of the second largest shareholder among firms in the area covered by the first two characters of the zipcode.

b. *Avg\_SecondShh\_Industry*: Average ownership stake of the second largest shareholder among firms that share the same two digit-SIC code as the focus firm.

**Table 6: Agency problems and corporate co-ownership of private firms**

1. Instrumented Variable: Jointly Owned

Instruments:

a. *Prop\_Jointly\_Owned\_Area*: Number of firms jointly owned by individuals and corporate entities divided by total number of firms in the area covered by the first two characters of the zipcode.

b. *Prop\_Jointly\_Owned\_Industry*: Number of firms jointly owned by individuals and corporate entities divided by total number of firms that share the same two-digit SIC code as the focus firm.

**Table 7: Agency problems: Public vs. private firms**

1. Instrumented Variable: Public Firm

Instruments:

a. *Prop\_Public\_Area*: Number of public firms divided by total number of firms in the area covered by the first two characters of the zipcode.

b. *Prop\_Public\_Industry*: Number of public firms divided by total number of firms that share the same two-digit SIC code as the focus firm.

**Table 8: Horizontal and vertical agency problems in private firms: Robustness tests using firms exempt from auditing requirements**

1. Instrumented Variable: Vertical Agency Problem

Instruments: See description for Table 2.

2. Instrumented Variable: Horizontal Agency Problem

Instruments: See description for Table 3

3. Instrumented Variable: Vertical & Horizontal

Instruments: See description for Table 4

**Table 9: Vertical and horizontal agency costs in private firms: Robustness tests using excess executive compensation as agency cost proxy:**

1. Instrumented Variable: Vertical Agency Problem

Instruments: See description for Table 2.

2. Instrumented Variable: Horizontal Agency Problem

Instruments: See description for Table 3

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**Table 1: Sample distribution and summary statistics**

Panel A presents summary statistics and Panel B presents industry distribution of 109,534 U.K. public and private firm-year observations between 2004 and 2010. Private firms are further categorized into firms owned by one individual, one family, multiple families, and jointly owned by individuals and corporations, respectively. Firms are classified as owner-managed if managers collectively own more than 99% of the firm. Non owner-managed firms are associated with the presence of vertical agency problem. Firms with unequal ownership stakes among owners are associated with the presence of horizontal agency problem. Please refer to Appendix B for a description of the other variables.

**Panel A: Distribution and summary statistics**

Variable	Public firms	Private firms	Further classification of private firms: Private firms owned by:			
			One individual	One family	Multiple families	Corporate co-ownership
Firm-Year Observations	6,156	103,378	9,648	15,079	33,294	45,357
Firms	1,761	40,698	4,657	6,375	13,741	18,733
<i>Financial characteristics (Average values)</i>						
Assets (000's)	906,991	32,498	15,041	11,793	12,786	57,565
Sales (000's)	708,016	24,239	16,126	14,848	15,601	35,427
Firm Age (years)	25.8	17.2	13.5	21.8	20.2	14.3
Total Debt/Assets	0.237	0.416	0.399	0.299	0.300	0.546
Total Liabilities/Assets	0.568	0.757	0.765	0.617	0.672	0.864
Bank Debt/Assets	0.063	0.063	0.076	0.073	0.068	0.054
Bank Loan (0/1)	0.652	0.425	0.435	0.543	0.486	0.338
Dividend (0/1)	0.504	0.311	0.301	0.418	0.399	0.213
Qui Score	77	76	75	79	79	75
<i>Ownership and management characteristics (Average values)</i>						
Available Stake	0.720	0.991	0.997	0.999	0.999	0.982
Managerial Ownership	0.174	0.573	0.998	0.440	0.646	0.378
Owner Managed (0/1)	0.000	0.173	0.770	0.065	0.272	0.010
Vertical Agency Problem (0/1)	NA	0.827	0.225	0.935	0.727	0.989
Horizontal Agency Problem (0/1)	NA	0.831	0.000	0.647	0.746	0.922
Largest Stake	0.206	0.654	0.997	0.614	0.510	0.699
Second Largest Stake	0.113	0.199	0.000	0.308	0.279	0.147

**Panel B: Industry distribution**

Industry	Full Sample	Public Firms	Private Firms
Agriculture, Hunting and Forestry, Fishing	1,153	48	1,105
Business Activities	26,192	1,121	25,071
Community, Social and Personal Service Activities	6,832	380	6,452
Construction	8,671	211	8,460
Education, Health and Social Work	2,820	80	2,740
Hotels and Restaurants	3,186	144	3,042
Manufacturing	15,466	1,799	13,667
Others Not Classified Elsewhere	1,270	90	1,180
Real Estate Activities	13,097	349	12,478
Rental of Machinery, Equipment and Household Goods	6,780	920	5,860
Retail Trade	4,203	289	3,914
Sale and Repair of Motor Vehicles	3,578	74	3,504
Transport, Storage and Communication	6,119	353	5,766
Wholesale Trade	10,167	298	9,869

**Table 2: Vertical agency problem in private firms**

The agency cost proxies are the differences in AT: sales to assets, OPEXP: operating expenses to sales, EBITD: earnings before interest, tax and depreciation to assets. Firms where managers collectively own at least 99% of the firm are classified as owner-managed and are associated with the absence of vertical agency problem. Non owner-managed firms constitute the rest of the sample and are associated with the presence of vertical agency problem. Panel A presents univariate results using the full sample and matched sample of private firms with and without vertical agency problem. Matching criteria are: same two-digit industry, assets within a 30% range and financial statements filed within 365 calendar days. Panels B through D present instrumental variables (IV) regression results. The instruments for the presence of vertical agency problem (Panel B) are the proportion of non-owner-managed firms at the fiscal year and two-digit SIC code level, and in the area covered by the first two characters of the zipcode. The instruments for managerial ownership (Panel C) are the average managerial ownership among firms at the fiscal year and two-digit SIC code level, and among firms in the area covered by the first two characters of the zipcode. The instruments for the number of shareholders per firm (Panel D) are the average number of shareholders per firm at the fiscal year and two-digit SIC code level, and in the area covered by the first two characters of the zipcode. \$\$ indicates predicted value from the first stage regression. Please refer to Appendices B & C for a description of all variables. Statistical significance at 10, 5 and 1 percent levels are respectively denoted by \*, \*\* and \*\*\*.

**Panel A: Vertical agency problem in private firms: Univariate analysis**

Sample	Matched Sample			Full Sample		
	Vertical Agency Problem	No Vertical Agency Problem	Difference	Vertical Agency Problem	No Vertical Agency Problem	Difference
AT	2.065	2.201	-6.2%***	2.071	2.200	-5.9%***
OPEXP	0.408	0.373	9.4%***	0.477	0.388	22.9%***
EBITD	0.104	0.119	-12.6%***	0.085	0.137	-37.9%***

**Panel B: Vertical agency problem in private firms: Instrumental variables regression analysis**

Column	(2)	(3)	(4)	(5)
Stage	First	Second	Second	Second
Dependent Variable	Vertical Agency Problem (0/1)	AT	OPEXP	EBITD
Vertical Agency Problem <sup>\$\$</sup>		-0.091*** (0.044)	0.038*** (0.011)	-0.027*** (0.006)
Prop_Vertical_Area	1.056*** (0.011)			
Prop_Vertical_Industry	0.649*** (0.086)			
Constant	-0.101 (0.180)	3.581 (0.745)	0.343* (0.196)	0.377*** (0.096)
Firm Characteristics	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Observations	63,175	63,175	63,175	63,175
Adjusted R-squared	0.17	0.29	0.14	0.18
H <sub>0</sub> : Exogenous Variables		0.446	0.165	0.136
H <sub>0</sub> : Weak Instruments		0.000	0.000	0.000

**Panel C: Effect of managerial ownership in private firms: Instrumental variables regression analysis**

Column	(2)	(3)	(4)	(5)
Stage	First	Second	Second	Second
Dependent Variable	Managerial Ownership	AT	OPEXP	EBITD
Managerial Ownership <sup>SS</sup>		0.276*** (0.054)	-0.027* (0.014)	0.043*** (0.007)
Avg_MgrOwn_Area	0.931*** (0.001)			
Avg_MgrOwn_Industry	0.609*** (0.062)			
Constant	-0.125 (0.137)	3.406*** (0.746)	0.343* (0.196)	0.356*** (0.095)
Firm Characteristics	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Observations	63,175	63,175	63,175	63,175
Adjusted R-squared	0.22	0.29	0.14	0.18
H <sub>0</sub> : Exogenous Variables		0.109	0.062	0.196
H <sub>0</sub> : Weak Instruments		0.000	0.000	0.000

**Panel D: Effect of number of shareholders in private firms: Instrumental variables regression analysis**

Column	(2)	(3)	(4)	(5)
Stage	First	Second	Second	Second
Dependent Variable	No. of Shh	AT	OPEXP	EBITD
No of Shh <sup>SS</sup>		-0.017*** (0.006)	0.004** (0.002)	-0.003*** (0.001)
Avg_ShH_Area	0.641*** (0.010)			
Avg_ShH_Industry	0.485*** (0.042)			
Constant	-1.724 (1.376)	1.695*** (0.570)	0.356* (0.196)	0.368*** (0.096)
Firm Characteristics	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Observations	63,175	63,175	63,175	63,175
Adjusted R-squared	0.29	0.29	0.14	0.18
H <sub>0</sub> : Exogenous Variables		0.702	0.034	0.327
H <sub>0</sub> : Weak Instruments		0.000	0.000	0.000

**Table 3: Horizontal agency problem in private firms**

The agency cost proxies are the differences in AT: sales to assets, OPEXP: operating expenses to sales, EBITD: earnings before interest, tax and depreciation to assets. The sample consists of private firms with at least two shareholders. Firms with equal ownership stake to all owners are associated with the absence of horizontal agency problem. Firms with unequal ownership stake to all owners are associated with the presence of horizontal agency problem. Panel A presents univariate results using the full sample and matched sample of private firms with and without horizontal agency problem. Panel B presents results of instrumental variables regression analysis. The instruments for the presence of horizontal agency problem are *Prop\_Horizontal\_Area* and *Prop\_Horizontal\_Industry* defined as the proportion of firms with horizontal agency problem at the fiscal year and two-digit SIC code level, and in the area covered by the first two characters of the zipcode. \$\$ indicates predicted value from the first stage regression. Please refer to Appendices B & C for a description of all variables. Statistical significance at 10, 5 and 1 percent levels are respectively denoted by \*, \*\* and \*\*\*.

**Panel A: Horizontal agency problem in private firms: Univariate analysis**

Sample	Matched Sample			Full Sample		
	Horizontal Agency Problem	No Horizontal Agency Problem	Difference	Horizontal Agency Problem	No Horizontal Agency Problem	Difference
AT	2.034	2.147	-5.3%***	2.022	2.171	-6.9%***
OPEXP	0.430	0.362	18.8%***	0.484	0.399	21.3%***
EBITD	0.093	0.124	-25.0%***	0.082	0.128	-35.9%***

**Panel B: Horizontal agency problem in private firms: Instrumental variables regression analysis**

Column	(2)	(3)	(4)	(5)
Stage	First	Second	Second	Second
Dependent Variable	Horizontal Agency Problem (0/1)	AT	OPEXP	EBITD
Horizontal Agency Problem <sup>\$\$</sup>		-0.305*** (0.111)	0.215*** (0.030)	-0.035** (0.015)
Prop_Horizontal_Area	0.372*** (0.011)			
Prop_Horizontal_Industry	0.205*** (0.078)			
Constant	-0.005 (0.182)	3.764*** (0.671)	0.295 (0.180)	0.385*** (0.087)
Firm Characteristics	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Observations	53,602	53,602	53,602	53,602
Adjusted R-squared	0.09	0.29	0.12	0.18
H <sub>0</sub> : Exogenous Variables		0.545	0.001	0.124
H <sub>0</sub> : Weak Instruments		0.000	0.000	0.000

**Table 4: Horizontal and vertical agency problems in private firms**

The dependent variables are AT: sales to assets, OPEX: operating expenses to sales, EBITD: earnings before interest, tax and depreciation to assets. Owner-managed firms are associated with the absence of vertical agency problems. Firms with equal ownership stake to all shareholders are associated with the absence of horizontal agency problems. Panels A presents univariate results of matched samples. Firm-year observations associated with both vertical and horizontal agency problems (treatment group) are matched with firm-year observations in every other group. The sample is then restricted to firm-year observations from the treatment group that are present in each of the three matched samples resulting in an equal number of observations in all groups. Panel B presents second stage results of instrumental variables (IV) regressions. *Vertical Agency Problem<sup>SS</sup>* is the IV for firms associated with vertical agency problem. *Horizontal Agency Problem<sup>SS</sup>* is the IV for firms associated with the presence of horizontal agency problem. *Vertical & Horizontal<sup>SS</sup>* is the IV for firms with the presence of both vertical and horizontal agency problems. Please refer to Appendices B & C for a description of all variables. Statistical significance at the 10%, 5% and 1% level are respectively denoted by \*, \*\* and \*\*\*.

**Panel A: Horizontal and vertical agency problem in private firms: Univariate analysis using matched samples**

		Absence of Vertical Agency Problem		Presence of Vertical Agency Problem	
		Average	% difference from base-case	Average	% difference from base-case
Absence of Horizontal Agency Problem	AT	2.276	0.0%	2.187	-3.9%***
	OPEXP	0.345	0.0%	0.356	3.2%***
	EBITD	0.132	0.0%	0.127	-3.8%***
Presence of Horizontal Agency Problem	AT	2.147	-5.7%***	2.065	-9.3%***
	OPEXP	0.379	9.9%***	0.417	20.9%***
	EBITD	0.113	-14.4%***	0.098	-25.8%***

**Panel B: Horizontal and vertical agency problem in private firms: Instrumental variables regression analysis**

Dependent Variable	(2) AT	(3) OPEXP	(4) EBITD
Vertical Agency Problem <sup>SS</sup>	-0.116** (0.054)	0.034** (0.015)	-0.022** (0.010)
Horizontal Agency Problem <sup>SS</sup>	-0.119** (0.055)	0.126*** (0.014)	-0.042** (0.009)
Vertical & Horizontal <sup>SS</sup>	-0.209*** (0.055)	0.039** (0.015)	-0.025** (0.010)
Constant	3.665 (0.446)	0.384 (0.057)	0.389 (0.056)
Firm Characteristics	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes
Observations	57,991	57,991	57,991
Adjusted R Squared	0.28	0.16	0.18

**Table 5: Horizontal agency problem in private firms: Role of majority control and second largest shareholder**

The sample is restricted to private firms with at least two shareholders. Panel A presents univariate results using firms matched on industry, size and timing of financial statements. Our first measure of contestability is the ownership stake of the second largest shareholder. Strong (Weak) Second Shh refers to firms in the fourth (first) quartile when sorted by second largest shareholder's stake. Our second measure of contestability is the absence of majority control. Majority control refers to firms where the controlling shareholder owns more than 50% of the firm. Panels B and C present second stage results of IV regressions. Proportion of firms with majority control at the fiscal year and two-digit SIC code level, and in the area covered by the first two characters of the zipcode are used as instruments for the presence of majority control. Average values of the second largest shareholder's stake at the fiscal year and two-digit SIC code level, and in the area covered by the first two characters of the zipcode are used as instruments for the second largest shareholder's stake. Please refer to Appendices B & C for a description of all variables. Statistical significance at the 10%, 5% and 1% level is denoted by \*, \*\* and \*\*\* respectively.

**Panel A: Contestability of control in private firms proxied by second largest shareholder and majority control: Univariate analysis using matched samples**

	Weak Second Shh	Strong Second Shh	Difference		Majority Control	No Majority Control	Difference
All firms				All firms			
AT	1.835	2.047	-10.4%***	AT	2.065	2.097	-1.5%**
OPEXP	0.481	0.378	27.2%***	OPEXP	0.425	0.416	2.2%***
EBITD	0.083	0.119	-30.3%***	EBITD	0.094	0.116	-19.0%*
Firms with majority control				Firms with weak second shh			
AT	1.914	2.083	-8.1%***	AT	1.914	1.851	3.4%***
OPEXP	0.454	0.417	8.9%***	OPEXP	0.443	0.534	-17.0%***
EBITD	0.083	0.108	-23.1%***	EBITD	0.087	0.062	40.3%***
Firms without majority control				Firms with strong second shh			
AT	1.614	1.871	-13.7%***	AT	2.259	2.335	-3.3%*
OPEXP	0.521	0.376	38.6%***	OPEXP	0.380	0.342	11.1%
EBITD	0.082	0.120	-31.7%***	EBITD	0.115	0.124	-7.3%***

**Panel B: Contestability of control in private firms: Instrumental variables regressions second stage results**

Column	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Dependent Variable	AT	OPEXP	EBITD	AT	OPEXP	EBITD	AT	OPEXP	EBITD
Majority Control <sup>SS</sup>	-0.063*	0.018*	-0.012**				-0.085*	-0.007	-0.001
	(0.035)	(0.010)	(0.005)				(0.044)	(0.012)	(0.006)
Second Largest Shh <sup>SS</sup>				0.322***	-0.164***	0.093***	0.363**	-0.155***	0.073***
				(0.124)	(0.034)	(0.017)	(0.159)	(0.042)	(0.021)
Constant	3.744***	0.266	0.350***	3.543***	0.334*	0.312***	3.316***	0.422**	0.307***
	(0.739)	(0.202)	(0.100)	(0.741)	(0.202)	(0.100)	(0.725)	(0.193)	(0.095)
Firm Characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	53,602	53,602	53,602	53,602	53,602	53,602	53,602	53,602	53,602
Adjusted R-squared	0.29	0.14	0.18	0.29	0.14	0.18	0.29	0.15	0.29
H <sub>0</sub> : Exogenous variables	0.004	0.685	0.958	0.934	0.627	0.282	NA	NA	NA
H <sub>0</sub> : Weak Instruments	0.000	0.000	0.000	0.000	0.000	0.000	NA	NA	NA



**Panel C: Contestability of control versus majority control: Instrumental variables regressions second stage results**

Column	(2)	(3)	(4)	(5)	(6)	(7)
Dependent Variable	AT	OPEXP	EBITD	AT	OPEXP	EBITD
Second largest shh <sup>SS</sup>	0.257** (0.130)	-0.143*** (0.032)	0.075*** (0.018)			
Second largest shh <sup>SS</sup> x Majority control <sup>SS</sup>	0.274* (0.141)	0.014 (0.033)	-0.025 (0.018)			
Majority control <sup>SS</sup>				0.055 (0.037)	0.005 (0.010)	-0.005 (0.005)
Majority control <sup>SS</sup> x Strong Second Shh <sup>SS</sup>				0.135*** (0.043)	-0.058*** (0.011)	0.022*** (0.006)
Majority control <sup>SS</sup> x Weak Second Shh <sup>SS</sup>				0.104*** (0.038)	-0.005 (0.010)	0.008 (0.005)
Constant	3.281*** (0.516)	0.420*** (0.063)	0.310*** (0.044)	3.515*** (0.419)	0.392*** (0.051)	0.344*** (0.041)
Firm Characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	53,602	53,602	53,602	53,602	53,602	53,602
Adjusted R-squared	0.29	0.14	0.18	0.29	0.14	0.17

**Table 6: Agency problems and corporate co-ownership of private firms**

This table presents results on agency problems arising from complex ownership structures proxied by corporate co-ownership of private firms. The agency proxies are the differences in AT: sales to assets, OPEXP: operating expenses to sales, EBITD: earnings before interest, tax, and depreciation to assets. *Jointly owned (0/1)* is a binary variable that equals 1 for firms owned jointly by individuals and other corporations. Panel A presents univariate statistics using the full sample and matched sample. Panel B presents results of instrumental variables regressions. Proportion of firms co-owned by individuals and corporations at the fiscal year and two-digit SIC code level, and in the area covered by the first two characters of the zipcode are used as instruments for corporate co-ownership. Please refer to Appendices B & C for a description of all variables. Statistical significance at 10, 5 and 1 percent levels are respectively denoted by \*, \*\* and \*\*\*.

**Panel A: Corporate co-ownership in private firms: Univariate analysis**

Sample	Matched Sample			Full Sample		
	Jointly owned	Not Jointly Owned	Difference	Jointly owned	Not Jointly Owned	Difference
AT	1.925	2.063	-6.7%***	1.920	2.167	-11.4%***
OPEXP	0.561	0.422	32.9%***	0.554	0.391	41.7%***
EBITD	0.052	0.118	-55.9%***	0.053	0.122	-56.6%***

**Panel B: Corporate co-ownership in private firms: Instrumental variable regression analysis**

Column	(2)	(3)	(4)	(5)
Stage	First	Second	Second	Second
Dependent Variable	Jointly owned (0/1)	AT	OPEXP	EBITD
Jointly Owned <sup>SS</sup>		-0.163*** (0.058)	0.153*** (0.015)	-0.016** (0.008)
Prop_Jointly_owned_Area	0.605*** (0.009)			
Prop_Jointly_owned_Industry	0.384*** (0.060)			
Constant	0.054*** (0.158)	3.549*** (0.669)	0.381** (0.178)	0.350*** (0.086)
Firm Characteristics	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Observations	63,175	63,175	63,175	63,175
Adjusted R-squared	0.23	0.29	0.13	0.18
H <sub>0</sub> : Exogenous Variables		0.447	0.000	0.667
H <sub>0</sub> : Weak Instruments		0.000	0.000	0.000

**Table 7: Agency problems: Public vs. private firms**

Panels A and B present univariate and instrumental variables (IV) regression results of a matched sample of 5,163 public and private firm-year observations. The agency cost proxies are the differences in AT: sales to assets, OPEXP: operating expenses to sales, EBITD: earnings before interest, tax and depreciation to assets. *Prop\_Public\_Area* is the proportion of public firms in a given geographical unit defined as the area encompassing the first two characters of the zipcode. *Prop\_Public\_Industry* is the proportion of public firms is the proportion of publicly traded firms at the two-digit SIC level. Columns 2 and 3 of Panel B present results of the first and second stage IV regressions with Public and AT as the dependent variables, respectively. Columns 4 and 5 of Panel B present second stage IV regressions with OPEXP and EBITD as dependent variables. \$\$ indicates predicted value from the first stage regression. Please refer to Appendices B & C for a description of all variables. Statistical significance at 10, 5 and 1 percent levels are respectively denoted by \*, \*\* and \*\*\*.

**Panel A: Agency costs in public and private firms: Univariate analysis using matched sample**

	Matched sample characteristics		Differences in agency cost proxies		
	Public Firms	Private Firms			
	Mean	Mean	Mean	Median	
Assets (£ mn)	241.1	230.0	AT	-15.2%***	-10.4%***
Total Debt/Total Assets	0.228	0.306	OPEXP	45.3%***	35.4%***
Quiscore	77.3	78.6	EBITD	-138.4%***	-29.2%***

**Panel B: Agency costs in public and private firms: Instrumental variables regression analysis**

Column	(2)	(3)	(4)	(5)
Stage	First	Second	Second	Second
Dependent Variable	Public (0/1)	AT	OPEXP	EBITD
Public <sup>\$\$</sup>		-0.322** (0.158)	0.660*** (0.090)	-0.211*** (0.034)
Prop_Public_Area	2.496*** (0.145)			
Prop_Public_Industry	0.513* (0.270)			
Constant	0.078 (0.072)	2.342*** (0.197)	0.155 (0.119)	-0.174*** (0.044)
Firm Characteristics	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Observations	8,196	8,196	8,196	8,196
Adjusted R-squared	0.27	0.22	0.15	0.26
H <sub>0</sub> : Exogenous Variables		0.357	0.418	0.000
H <sub>0</sub> : Weak Instruments		0.000	0.000	0.000

**Table 8: Horizontal and vertical agency problems in private firms: Robustness tests using firms exempt from auditing requirements.**

The dependent variables are AT: sales to assets, OPEX: operating expenses to sales, EBITD: earnings before interest, tax, and depreciation to assets. Univariate results presented in Panel A are based on approximately 500,000 firm-year observations (Please refer to appendix table A.4 for a description). Owner-managed firms are associated with the absence of vertical agency problems. Firms with equal ownership stake for all shareholders are associated with the absence of horizontal agency problems. Panel B presents second stage results of instrumental variables (IV) regressions. *Vertical Agency Problem*<sup>SS</sup> is the IV for firms associated with vertical agency problem. *Horizontal Agency Problem*<sup>SS</sup> is the IV for firms associated with the presence of horizontal agency problem. *Vertical & Horizontal*<sup>SS</sup> is the IV for firms with the presence of both vertical and horizontal agency problems. Please refer to Appendices B & C for a description of all variables. Statistical significance at the 10%, 5% and 1% level are respectively denoted by \*, \*\* and \*\*\*.

**Panel A: Horizontal and vertical agency problem in private firms: Univariate analysis including extremely small private firms exempt from auditing requirements**

		Absence of Vertical Agency Problem		Presence of Vertical Agency Problem	
		Average	% difference from base-case	Average	% difference from base-case
Absence of Horizontal Agency Problem	AT	3.420	0.0%	3.250	-5.0%***
	OPEXP	0.418	0.0%	0.429	2.6%***
	EBITD	0.633	0.0%	0.577	-8.8%***
Presence of Horizontal Agency Problem	AT	2.730	-20.2%***	2.305	-32.6%***
	OPEXP	0.443	6.0%***	0.455	8.9%***
	EBITD	0.372	8.9%***	0.302	-52.3%***

**Panel B: Horizontal and vertical agency problem in private firms: Instrumental variables regression analysis including extremely small private firms exempt from auditing requirements**

	(2)	(3)	(4)
Dependent Variable	AT	OPEXP	EBITD
Vertical Agency Problem <sup>SS</sup>	-0.120*** (0.012)	0.031*** (0.001)	-0.018*** (0.003)
Horizontal Agency Problem <sup>SS</sup>	-0.114*** (0.017)	0.028*** (0.002)	-0.026*** (0.004)
Vertical & Horizontal <sup>SS</sup>	-0.068*** (0.020)	0.006** (0.002)	-0.012** (0.005)
Constant	4.775*** (0.854)	0.566*** (0.076)	0.996*** (0.093)
Firm Characteristics	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes
Observations	286,445	286,445	286,445
Adjusted R Squared	0.36	0.19	0.38

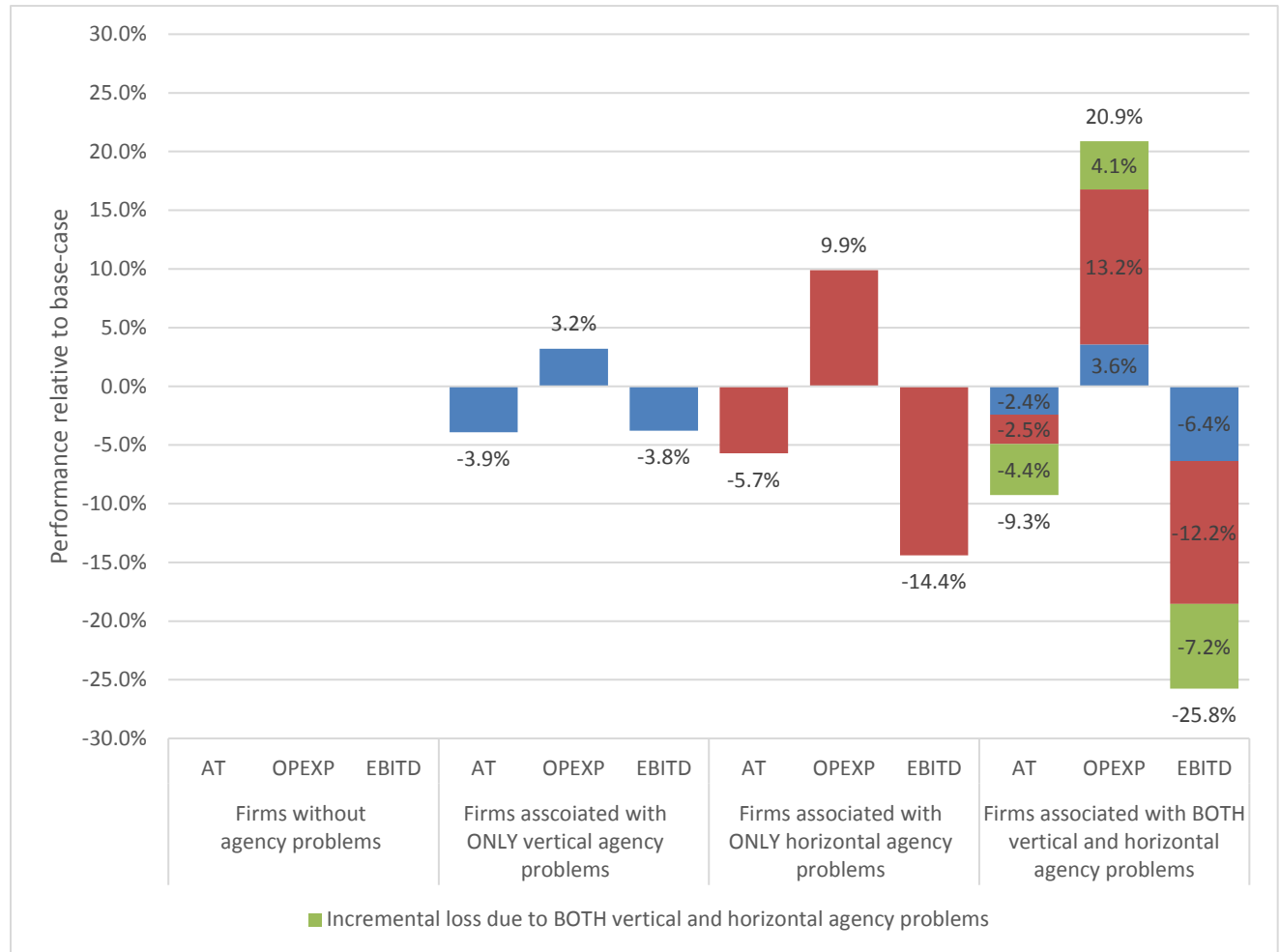
**Table 9: Vertical and horizontal agency costs in private firms: Robustness tests using excess executive compensation as agency cost proxy**

This table presents second stage results of instrumental variable regression (IV) using level and changes in executive compensation as dependent variables. *Vertical Agency Problem<sup>SS</sup>* (*Horizontal Agency Problem<sup>SS</sup>*) is IV for the presence of vertical (horizontal) agency problem and is described in Table 2 (Table 3). Non-owner-managed firms are associated with vertical agency problem and firms with unequal ownership stakes among all owners are considered to be associated with horizontal agency problem. Please refer to Appendices B & C for a description of all variables. Statistical significance at the 10%, 5% and 1% level ad respectively denoted by \*, \*\* and \*\*\*.

Dependent Variable	(2)	(3)	(4)	(5)
	Log (Executive Compensation)			% Change in Executive Compensation
Vertical Agency Problem <sup>SS</sup>	0.084*** (0.031)		0.066** (0.031)	0.048 (0.053)
Horizontal Agency Problem <sup>SS</sup>		0.306*** (0.038)	0.300*** (0.038)	0.162** (0.064)
Vertical Agency Problem <sup>SS</sup> * ΔOp. Profit				-0.548*** (0.202)
Horizontal Agency Problem <sup>SS</sup> * ΔOp. Profit				-0.500** (0.222)
Δ Op. Profit	0.040 (0.025)	0.040 (0.025)	0.040 (0.025)	-0.809*** (0.075)
Lagged ΔOp. Profit	0.011 (0.021)	0.012 (0.021)	0.012 (0.021)	0.110*** (0.035)
Sales Growth	-0.000* (0.000)	-0.000* (0.000)	-0.000* (0.000)	0.000*** (0.000)
Log(Assets)	0.471*** (0.005)	0.465*** (0.005)	0.464*** (0.005)	0.148*** (0.007)
FirmAge	0.002*** (0.000)	0.002*** (0.000)	0.002*** (0.000)	-0.005*** (0.001)
Bank Loan	-0.490*** (0.046)	-0.488*** (0.046)	-0.483*** (0.046)	-0.612*** (0.076)
Total Liabilities	0.173*** (0.014)	0.172*** (0.014)	0.171*** (0.014)	0.025 (0.023)
No. of Subsidiaries	0.002*** (0.001)	0.001*** (0.001)	0.001*** (0.001)	-0.003** (0.001)
Constant	0.638*** (0.125)	0.789*** (0.155)	0.826*** (0.169)	-0.319 (0.820)
Financial Distress Controls	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Observations	45,160	45,160	45,160	45,160
Adjusted R-squared	0.35	0.36	0.36	0.10

**Figure 1: Agency problems in private firms: Summary figures**

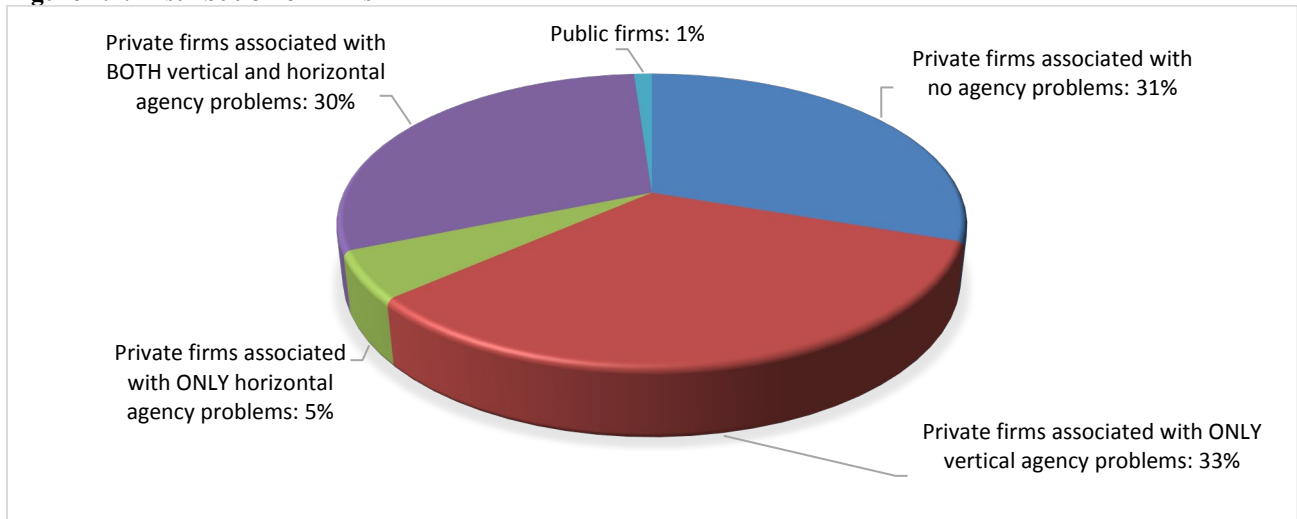
This figure is based on the results presented in Panel A of Table 4 and illustrates the loss in performance in private firms associated with vertical, horizontal, and both vertical and horizontal agency problems relative to the base-case of firms without agency problems. For firms associated with both vertical and horizontal agency problems, the relative contributions of each and the incremental performance loss attributable to the presence of both the problems are imputed from the regression results presented in Panel B of Table 4.



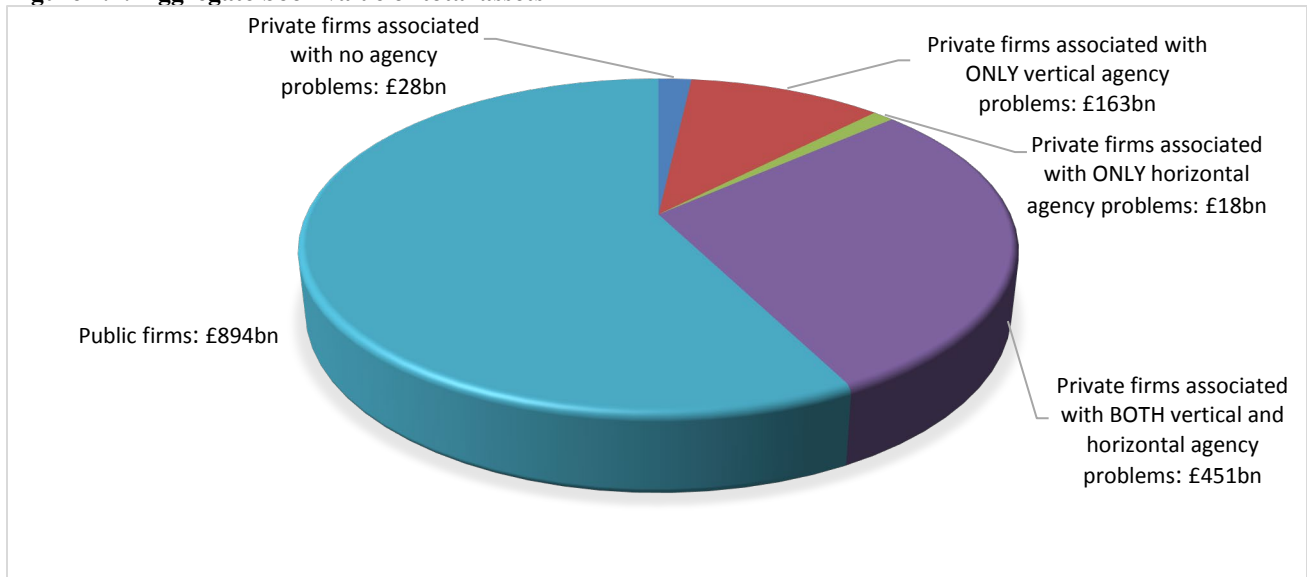
**Figure 2: Economic relevance of vertical and horizontal agency problems: One period estimate**

Figures 2.1 to 2.4 illustrate the economic relevance of vertical and horizontal agency problems. Estimates are based on 107,535 private and public firms covered by the *Bureau Van Dijk* database for fiscal year 2006. Included also are the relatively smaller private firms that are exempt from the auditing requirements of U.K. Companies House. Figure 2.1 presents a distribution of the firms. Figure 2.2 presents aggregate book value of assets for each group of firms. Figure 2.3 presents monetary estimates resulting from higher operating expenses incurred by firms associated with agency problems. These expenses are estimated in billions of pounds and as a percent of the United Kingdom’s Gross Domestic Product in 2006 (approximately £1.5 trillion). Figure 2.4 presents similar estimates resulting from loss in earnings incurred by firms associated with agency problems.

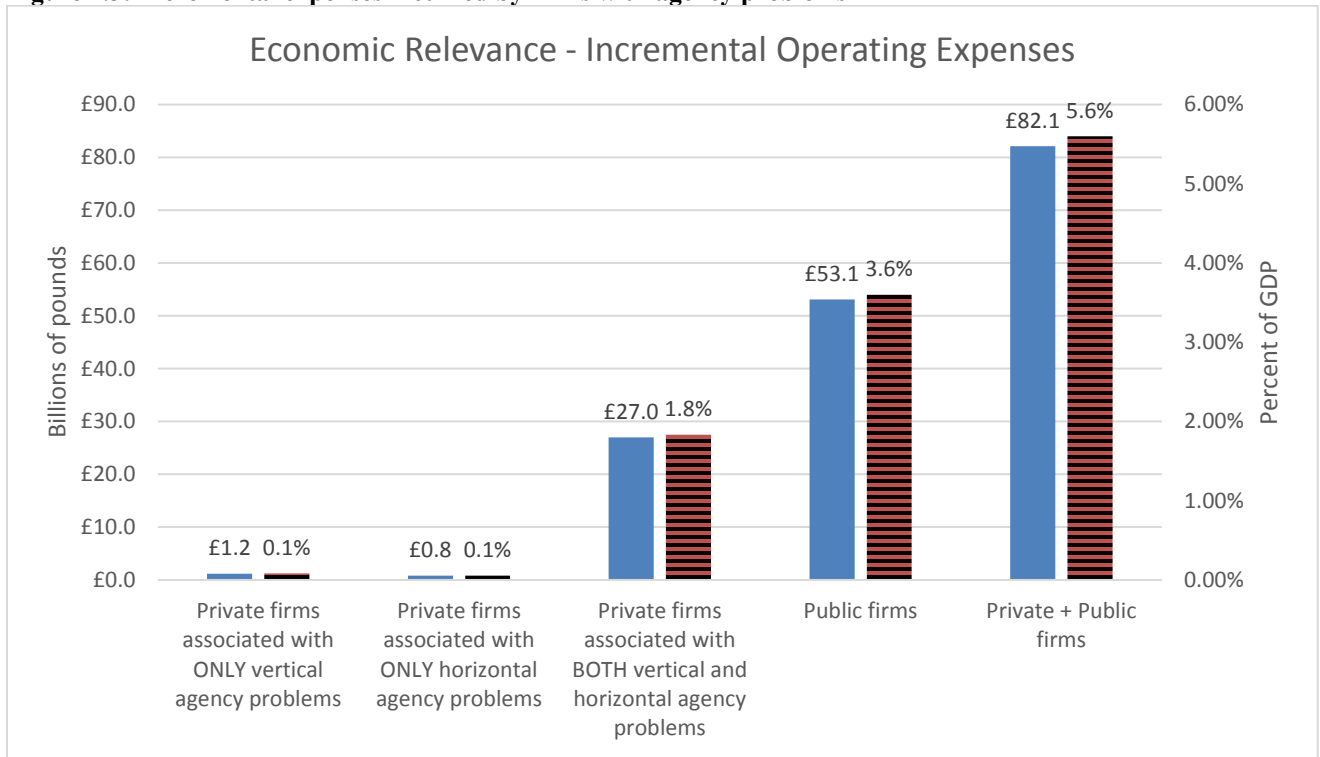
**Figure 2.1: Distribution of firms**



**Figure 2.2: Aggregate book value of total assets**



**Figure 2.3: Incremental expenses incurred by firms with agency problems**



**Figure 2.4: Loss in earnings incurred by firms with agency problems**

