Investment and financing decisions of private and public firms

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Abstract

This paper analyzes the differences in investment and financing decisions of private and public firms by focusing on their use of cash flow. Our tests cover all channels through which a firm can spend its cash flow or compensate for lack of internal funds. Using a large dataset of private and public firms from Western Europe, we create a sample of matching firms to isolate the effects of private and public ownership. Our results show that private and public firms behave significantly different in their investment and financing decisions. Private firms exhibit lower investment-cash flow sensitivities and a stronger link between performance and shareholder distributions. We find that these differences between private and public firms can be accounted for entirely by their use of unexpected cash flow. However, our results can only be observed in countries with a highly developed and liquid stock market and low ownership concentration. We conclude that it is the "dark side" of liquidity that reduces the incentives for shareholders to actively monitor managers and, eventually, leads to inefficient cash flow allocation in public firms.

Keywords: Corporate investment; Q theory; agency costs; private firms; managerial incentives.

JEL classification codes: D22; D92; G31; G32; G34.

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I. Introduction

Investment and financing decisions are essential for firms to ensure operational functionality and to enable growth. As they are subject to different restrictions and opportunities, it is reasonable to assume that private and public firms behave differently in their investment and financing choices. On the one hand, public firms have access to organized capital markets and, supposedly, are better positioned to raise external funds than their privately owned counterparts. On the other hand, ownership in modern listed joint-stock companies is widely dispersed, leading to an unemotional, performance-centered relationship between shareholders and the firms they own. Since their ownership is concentrated, private firms suffer less from agency conflicts that will result from the separation of ownership and control, and often managers are also owners of the company (Ang, Cole, and Lin, 2000). Opposed to that, publicly traded firms tend to have diversified ownership structures, where the management holds little to no share in the firm. The mere existence of these differences and their effects on corporate decisions seems undisputed. By comparing public and private firms' investment and financing decisions, we aim to quantify the extent to which these distinctions distort investment and financing decisions.

The literature proposes two (opposing) effects on investment caused by the delegation of control over a firm: short-termism and empire-building. Short-termism describes myopic behavior by managers. A stock market listing puts pressure on managers by constantly valuing the company through its share price. Following the organizational theory of Hirschmann (1970), shareholders have two options to react to poor management quality. They can either sell their shares ("exit" option), or express their discontent and eventually replace the management ("voice" option). Concerned with their reputation, their jobs, their company's stock

price, or all at once, managers could exhibit short-termism. Long-term growth might be distorted to boost short-term performance (e.g., by hitting earnings benchmarks), either to increase managers' reputation (Narayanan, 1985) or to increase the firm's stock price (Stein, 2003). Put briefly, short-termism affects investment decisions in a way that leads to underinvestment by foregoing sustainable long-term growth.

A different strand of literature proposes the exact contrarian relation between capital allocation and the delegation of control that results in empire-building, that is, inefficient allocation of capital. One manifestation, managers' tendency to overinvest, is caused by the agency conflict between owners and managers of a firm. If managers seek to manage a larger company rather than an optimally-sized company in the sense of profitability, they could pursue excessive growth of the firm. Any investment leading to a deviation from the optimal firm size results in an inefficient allocation of capital and reduces potential distributions to shareholders (Jensen, 1986). The combination of dispersed ownership and little incentive for minority shareholders to actively monitor management is an ideal soil for such managerial misconduct at the expense of shareholder value.

This paper aims to shed light on private and public firms' investment and financing behavior by comparing the allocation of internal cash flow. We understand private firms as a benchmark for how a firm allocates cash flow under a lesser degree of agency conflicts. In doing so, we follow Ang, Cole, and Lin (2000), who use private firms as a zero-base case to measure how dispersed ownership in public firms relates to agency costs. Ex ante, it is difficult to predict how different ownership types affect cash flow allocation. Private firms should be less affected by overinvestment of managers pursuing personal objectives because concentrated ownership is expected to increase monitoring. In the extreme case of a single owner-

manager, agency conflicts are non-existent at all (Jensen and Meckling, 1976). At the same time, the propensity for short-termism that leads to underinvestment, e.g., the need to "deliver earnings" (Graham et al., 2005), could also be higher for public firms. Private firms are not subject to anonymous stock market pressure and have a stronger link between ownership and control.

In a text-book finance world without capital market frictions, internally generated cash flow should not affect a firm's investment decisions. Positive net present value-bearing projects can always be financed by raising outside debt or equity if a company lacks sufficient internal funds.[1] However, empirical evidence, dating back to the influential work of Fazzari, Hubbard, and Petersen (1988), suggests that firms exhibit investment-cash flow sensitivities. Since then, the dependency of firms' investment on cash flow has been confirmed by numerous studies over different periods of time and for different markets. However, the traditional single-equation model proposed by Fazzari, Hubbard, and Petersen (1988) omits the different channels a company can use to spend cash flow and to compensate for lacking cash flow. We use an investment and financing model proposed by Lewellen and Lewellen (2014) to examine cash flow allocation in private and public firms. The model provides cash flow sensitivities for all channels a company can use to spend cash flow: increases of cash holdings, investments in working capital, investments in fixed assets (including acquisitions), decreases of debt, share repurchases, and distributions to shareholders.

In our basic setting, we confirm evidence found in the earlier study of Mortal and Reisel (2013), suggesting that private firms do not differ from public firms in their investment

[1] This is equivalent to proposition III from Modigliani and Miller (1958): "[…] the cut-off point for investment in the firm […] will be completely unaffected by the type of security used to finance the investment."

reaction towards cash flow. We find that this surprising result is due to missing variables that influence investment and financing decisions. After controlling for the intertemporal effects of cash flow, a firm's financial condition, and its profitability, private firms exhibit no significant investment-cash flow sensitivity, whereas public firms react significantly to changes in cash flow in their investment decisions. Our multivariate model further allows us to observe how the difference in investment spending affects other investment and financing decisions.

Furthermore, we find a different cash flow allocation for private and public firms. We show that private firms distribute a much larger fraction of every additional dollar of cash flow to shareholders than public firms. Public firms aim for sticky dividends and smooth their distributions. This reluctance to align shareholder distributions with economic performance was first documented by Lintner (1956), and has been confirmed by Brav et al. (2005) more recently. Our findings also augment evidence from the U.K. by Michaely and Roberts (2012), who document that public firms pay higher dividends but are less responsive to changes in investment opportunities.

Jensen (1986) proposes that managers increase the size of the company beyond an optimal point by overinvesting if free cash flow is available and monitoring is low. Any excess cash flow available should be distributed to shareholders rather than invested in unprofitable investment projects. We provide further insights on the allocation of cash flow by separating cash flow into two parts: expected and unexpected. Expected cash flow is the predicted level of cash flow using data from past annual reports. This information is available to managers and shareholders alike in private and public firms. We find that private and public firms do not differ in their investment and financing decisions in reaction toward this expected, anticipated part of cash flow. Accordingly, the difference in the observed investment-cash flow

sensitivities between private and public firms must be accounted for by their reactions to the unexpected part of cash flow. In particular, our results indicate that public firms engage in excessive investment spending at the expense of shareholder distributions in reaction to changes in the unexpected part of cash flow. In the positive case, unexpected cash flow can be understood as windfall for managers to spend, and, in the negative case, as a shortfall to compensate for. As ownership and control are linked more closely in private firms, these firms may be better positioned to monitor and prevent management from overinvestment in the case of positive unexpected cash flow. In the case of negative unexpected cash flow, the relationship between owners and managers may prevent inefficient investment and financing decisions that managers undertake to meet investor expectations.

We further divide our sample into groups using a stock market development index (to proxy for liquidity) and ownership concentration in order to test our agency-based monitoring explanation. Our full sample results only hold for the subsample of firms from countries with a well-developed and liquid stock market as well as low ownership concentration. This finding is related to the recent strand of literature describing the "dark side" of liquidity. For example, Roosenboom, Schlingemann, and Vasconcelos (2013) and Chatterje et al. (2015) find that liquidity increases managerial overinvestment tendencies in M&A transactions. Any decreasing effect liquidity has on transaction prices lowers the threshold for large shareholders to sell their shares rather than actively monitor managers. Most importantly, the comparison between private and public firms indicates that it is not only the mere separation of ownership and control but also the degree to which shareholders can transfer ownership at low cost that decreases active monitoring of managers by their shareholder and, eventually, allows managers to inefficiently allocate cash flow.

The remainder of this paper is structured as follows. Section II provides an overview of the literature on the distinctions in the investment and financing behavior of private and public firms as well as on the relation between agency conflicts and investment. Section III describes our data sample and the matching procedure. Section IV presents our empirical research design and main results. Sections V and VI provide robustness tests for alternative drivers of our results and an additional perspective on the results by comparing subsamples.

II. Literature review

A. Comparison between private and public firms

Empirical financial research, driven by the mere availability of data, has long been focused on public firms. In recent years, however, a number of studies have analyzed differences in the financing and investment behavior of private firms as compared to public firms. Asker, Farre-Mensa, and Ljungqvist (2014) analyze the investment behavior of both private and public firms in response to changing investment opportunities. In their sample of U.S. firms, public firms invest less (measured as a fraction of total assets), on average, and exhibit smaller reactions to changes in their investment opportunities. They further find that this pattern is particularly pronounced for public firms whose stock prices are strongly influenced by earnings announcements. The authors conclude that the stock market pressure induces managers of public firms to increase earnings by forgoing positive net present value investment opportunities and, eventually, distorts efficient capital allocation.

Mortal and Reisel (2013) apply a similar research design for European firms. In contrast to Asker, Farre-Mensa, and Ljungqvist (2014), they find that public firms invest more,

on average, and exhibit higher investment sensitivities towards growth opportunities compared to private firms. Since this difference can only be observed for countries with a highly developed stock market, the authors conclude that the access to organized capital markets enables public firms to make better use of growth opportunities.

Based on publicly available supply and demand data from the U.S. chemical industry, Sheen (2011) finds that private firms adjust production capacity more actively than public firms. For a small sample of firms, he shows that private firms invest more efficiently by timing investment to benefit from demand increases and to avoid negative shocks. For a unique dataset of private and public firms from the natural gas industry, Gilje and Taillard (2014) show that private firms adjust their drilling operations substantially less to changes in the gas price. Moreover, private firms are less likely to engage in capital intensive exploitation of newly discovered shale gas deposits and prefer to sell drilling rights to public firms from the same sector. The authors thus conclude that through their access to organized capital markets public firms are better positioned to make use of capital intensive growth opportunities.

Brav (2009) studies private and public firms from the U.K. and finds that private firms rely significantly more on debt financing and, as a result, have higher debt ratios.[2] The reluctance to finance using external equity capital is most pronounced for private firms with high information asymmetry between insiders and outsiders, i.e., firms with concentrated ownership structure and low transparency. Moreover, Brav (2009) shows that public firms use profits to invest, while private firms increase their cash holdings and increase their investments in reaction to increases of profitability only with a time delay. His study also finds evidence for

[2] Goyal, Nova, and Zanetti (2011) confirm the finding of lower leverage ratios for private firms in a study of private and public firms using data from 18 European countries.

a strong link between performance and distributions to shareholders in private firms that cannot be observed in public firms. Michaely and Roberts (2012) support these findings. They document that private firms pay lower dividends but adjust their dividends significantly more in response to changes in earnings.

Finally, studying the cash holdings of U.S. private and public firms, Gao, Harford, and Li (2013) find that the cash holdings of private firms are only half as large as those in matched public firms. Most importantly, they show that public firms allocate excess cash myopically in investment projects that reduce performance.

B. Agency conflicts and investment

As proposed by Stein (2003), amongst all the factors distorting efficient investment in the sense of Modigliani and Miller (1958), agency conflicts may be the most influential force. Because of the different degree to which private and public firms suffer from agency conflicts between owners and managers, any study that focuses on the comparison of investment and financing behavior between private and public firms also relates to the more general field of research concerned with the effects of information asymmetries and agency conflicts on corporate capital allocation. We understand private firms as a benchmark for how firms that suffer from a lower to non-existent degree of agency conflicts allocate cash flow. This approach follows Ang, Cole, and Lin (2000), who show that agency conflicts are higher when the firm is managed by an outsider, and decrease with managerial ownership. These two features are the most prominent organizational distinctions between private and public firms.

Dating back to the seminal work of Jensen and Meckling (1976), studies have analyzed the impact that agency conflicts, resulting from information asymmetries between man-

agers and owners, have on investment decisions. One manifestation of this agency conflict is the tendency for managerial overinvestment. Jensen (1986) describes how managers increase firm size above an optimal point by overinvesting free cash flow in unprofitable investment opportunities or build up cash holdings rather than to distribute it to the shareholders. This pursuit of private objectives by managers is also referred to as "empire-building" and can be expected to be most pronounced when the level of free cash flow is high (Stein, 2003). Moreover, by withholding excess cash flow, managers avoid both raising external capital and being monitored by investors. Gompers, Ishii, and Metrick (2003) find empirical evidence that is consistent with this hypothesis. In their sample of U.S. listed firms, those firms with the lowest shareholder rights have the highest capital expenditures.

The overinvestment hypothesis is also supported by a body of theoretical works that model the effects of ownership structure on capital allocation. Albuquerque and Wang (2008) propose that weaker investor protection at the country-level incentivizes overinvestment initiated by the controlling shareholder. Weaker (minority) investor protection enables the controlling shareholder to divert private benefits and, by doing so, to distort optimal investment behavior and distribution policy. Using the empire-building theory of Jensen (1986), Dow, Gorton, and Krishnamurthy (2005) model the effect of the imperfect control of shareholders over managers as well as the private benefit seeking of managers on investment behavior and asset pricing. Their model predicts overinvestment when corporate governance standards are weak and free cash flow is high. Stein (2003) concludes that empire-building tendencies need not manifest in overinvestment in general, but rather in excessive spending when free cash flow is available to managers. Overall, based on the empirical evidence and the theoretical

framework presented above, the separation of ownership and control in public firms leads to a stronger link between cash flow and investment compared to private firms.

Another strand of literature proposes the opposite effect. Narayanan (1985) and Stein (1989) argue that the stock market listing puts pressure on managers to meet short-term expectations of shareholders to preserve their reputation and secure their job. Managers may react myopically by distorting efficient investment plans for the benefit of short-term performance measures such as earnings. This corporate behavior is also known as short-termism and results in inefficient capital allocation through underinvestment.

An alternative channel through which information asymmetries lead to underinvestment is described in Myers and Majluf (1984). They show how information asymmetries between insiders and outsiders lead to distortion of efficient investment plans if external capital is necessary to fund corporate investments. Because of the negative signal that raising external equity sends to the market, managers rather forgo positive net value present value investment projects than to issue new shares. Taken together, given the assumptions of these studies, a stock market listing predicts public firms to underinvest compared to private firms. This inefficient corporate behavior is caused either by managerial precaution or by financial constraints resulting from agency conflicts between company insiders and outsiders.

III. Data and matching procedure

A. Sample

Our sample of private and public firms is from the Bureau van Dijk's (BvD) Amadeus database. Amadeus provides standardized accounting information for European private and

public companies for up to ten years.[3] Our sample covers the period from 2003 to 2013. To avoid reporting quality issues, we restrict the sample to Western European countries. We exclude government and state owned companies, utilities (SIC 4900-4999) and financial firms (SIC 6000-6999) as their investment and financing decisions are subject to regulatory restrictions. Furthermore, we follow Mortal and Reisel (2013) and exclude sole proprietorships, foreign companies, unlimited partnerships, cooperatives, and foundations. We restrict the sample to consolidated accounts to eliminate the effects of intragroup financing and investments. We delete firm-year observations with missing or negative entries for total assets or sales. Finally, we require non-missing observations for all dependent variables in our model. All variables, except for sales growth, are winsorized at the 0.5^{th} and 99.5^{th} percentile to account for outliers in the dataset; sales growth is trimmed at the 95^{th} percentile to account for the skewed distribution and extreme outliers.[4]

Amadeus reports the listing status of each company in the dataset as a time-invariant variable, i.e. if a company is listed in the last reported year the company will be reported as listed in all other available years. To account for changes in the type of ownership over time, we complement our dataset with listing and delisting dates for the companies in our sample from Bureau van Dijk's Osiris database. Some listing dates in Osiris represent dates of mergers of two previously publicly owned firms.[5] Therefore, we classify a firm as private only if it does not report an enterprise value before its listing date.

[3] The database is an established source in the young field of empirical research on private firms and has been used, amongst others, in Giannetti (2003) and Mortal and Reisel (2013).

[4] We use operating revenue instead of net sales to calculate sales growth because of data availability.

[5] An example is the merger of Shell Transportation and Trading Company and Royal Dutch Shell forming Royal Dutch Shell. Osiris reports July 20^{th}, 2005 as the IPO date, which is the first day the newly merged company was publicly traded. However, both firms were publicly held before.

We add additional country-level data to our dataset. We use World Bank data to compute an index of stock market development for each country in our dataset. We first calculate de-meaned values for the ratios market capitalization to GDP, value of stocks traded to GDP, and value of stocks traded to market capitalization (turnover). The index is then the sum of the three de-meaned values for each country. This approach is taken from Demirgüç-Kunt and Levine (1996), and has also been applied by Mortal and Reisel (2013). Furthermore, we add ownership concentration data from Faccio and Lang (2002). Our initial sample consists of 20,696 private firms with 94,133 firm-year observations and 2,272 public companies with 13,599 firm-year observations from 12 countries.[6]

B. Matching procedure

In our analysis we explore the differences in companies' investment and financing behavior that can be attributed to the status of being privately or publicly owned. To mitigate the influence of other factors, we create matches within our sample that in each case consist of one private and one public company with comparable size, and same industry and country of origin.

Our matching procedure is close to the approach implemented by Asker, Farre-Mensa, and Ljungqvist (2014). We match one private firm to each public firm. To be considered an eligible match for a public company, we require the private firm to be registered in the same country and to operate in the same industry (48 industry classification as defined by Fama and French, 1997). The matched private company is the company closest in size (measured by total assets in USD). Following the method used in Asker, Farre-Mensa, and Ljungqvist

[6] These 12 countries are: Austria, Belgium, Germany, Spain, Finland, France, Great Britain, Greece, Ireland, Italy, the Netherlands, and Sweden.

(2014), we discard nearest-neighbor matches where the ratio of totals assets of the matched companies is below 0.5 or above 2.

The matching is performed in 2012 because it is the year with the most observations for public companies in our sample. If no match can be found, the public company is not included in the matched sample. If a match is found within our restrictions, both companies, private and public, are included in the matched sample with their entire time-series. As opposed to Asker, Farre-Mensa, and Ljungqvist (2014), we match without replacement, i.e. if a private firm is matched to a public firm, that private firm cannot be matched to another firm.[7] Because public firms in our unmatched sample are much larger on average, the order of public firms in our sequential matching is crucial. As we aim to find the largest possible set of unique firms and do not allow for a private company to be matched twice, we start the matching procedure with the largest public firm. Starting with the smallest public firm would result in assigning relatively large private firms to relatively small public firms for which other eligible matches are available reducing the number of firms in the matched sample.

Our initial sample comprises 2,272 public firms of which 526 have no available data for the year 2012.[8] We start our matching procedure for the remaining 1,746 firms with the largest firm in terms of total assets. We lose 48 public firms in our matching process because we cannot find a private company from the same country and industry in 2012.[9] Finally, we

[7] Smith and Todd (2005) discuss the trade-off between matching with and without replacement. While matching with replacement increases the quality of the overall matched sample, as closer matches can be found, it reduces the number of distinct observations.

[8] Amongst these firms are all public firms from the Netherlands as our dataset does not include information for issued share capital in the Netherlands beyond 2010.

[9] We cannot find evidence for a systematic pattern in this exclusion. There are only three country-industry combinations with more than three public companies for which we cannot find an eligible private firm to match: French printing and publishing companies (12), French tobacco companies (5), and Greek textile companies (8).

exclude 322 nearest-neighbor matches due to the restriction that a company may not be half or twice the size of its match.[10] This matching procedure results in a matched sample of 1,376 private and 1,376 public firms with 7,373 and 9,255 firm-year observations, respectively.

[Insert Figure I here]

Figure I shows the size distribution of the full and the matched sample. It can be seen that the matching procedure generates an evenly size-distributed matched sample. The matched sample also mitigates the heterogeneous industry distribution of the private and public sample. Figure II illustrates the convergence of industry share among the two samples, measured in fraction of firm-year observations.[11]

[Insert Figure II here]

C. Descriptive Statistics

Table I presents summary statistics for major balance sheet items. Panel A shows data for the full (unmatched) sample. Public firms are much larger in the full sample, the difference in means is over 3 billion USD. However, the difference in medians of total assets between privates (50 million USD) and public companies (166 million USD) is smaller. Private companies rely more on fixed assets than public firms. The difference in means (48% vs. 40%) is economically sizeable and statistically significant. A large fraction of this difference can be explained by the difference in intangible assets. One explanation for the differences in intangible assets is the discrepancy in the applied accounting practices. While 75% of all public companies in our sample file their accounts under IFRS, only 9% of the private companies

[10] The mean ratio (total assets private company/total assets public firm) of the 322 excluded matches is 4.6.

[11] The distribution remains comparable when we consider share of total assets as can be seen in Figure A.I in the appendix.

in our sample do so. Sahut, Boulerne, and Teulon (2011) show that the adoption of IFRS from local GAAP in Europe leads to a substantial increase of recognized intangible assets on the balance sheet.[12] Equity accounts for a larger share of public companies' financing than it does for privates. This difference can almost entirely be explained by the issued share capital. Apparently, private and public companies make similar use of retained earnings and other equity reserves on the balance sheet. Furthermore, private companies tend to use more short-term debt than public firms.[13]

[Insert Table I here]

Although all differences remain significant, most of them decrease in magnitude in the matched sample, reported in Panel B, compared to the full sample. Most importantly, the difference in means of total assets reduces from 3 billion to 264 million USD and, as we have shown in Figure I, the distributions converge. After all, the persistence of heterogeneity between private and public companies' balance sheet structures is not a flaw of our matching procedure but reflects the effects the different type of ownership has on investment and financing decisions.

Panel C presents the balance sheet data and difference in means tests for the sample of matched pairs for the matching year, i.e., if a private company is matched to a public company in 2012, only the observation in the year 2012 for both companies is considered. Notably, the difference in total assets becomes insignificant. Most of the remaining differences found

[12] The difference remains sizeable when we compare only IFRS reporting private and public companies. However, the difference in intangible assets reduces from 13.4 percentage points to 7.6.

[13] Our results from comparing balance sheets from private and public companies results are consistent with evidence from Mortal and Reisel (2013), who also use data for private and public firms from Amadeus.

in the entire matched sample are also present in the formation year sample, thus confirming that the matching year cross-section is representative for the matched panel.

IV. Methodology and results

A. Investment and financing model

To investigate the relationship between cash flow and investment of public and private firms, we use the model proposed by Lewellen and Lewellen (2014). Their framework tests the effect of cash flow (*CF*) on the different channels cash flow can be spent through or compensated by. These channels of investment and financing include changes in cash holdings (*dCash*), changes in net working capital (*dNWC*), investments in or sales of fixed assets (*Inv*), changes in debt (*dDebt*), equity financing (*Issues*), and distributions to shareholders (*ShDis*). If these variables are observable the following equation should hold:

$$CF_t = dCash_t + dNWC_t + Inv_t - dDebt_t - Issues_t + ShDis_t$$

Because Amadeus does not provide information on statement of cash flow items, we approximate some of the necessary information from the balance sheet and income statements. *CF* is net income for the period plus depreciations, *dCash* is the annual change in cash holdings and cash holding equivalents, and *dNWC* is the annual change in net working capital (current assets minus cash minus non-operational short-term liabilities). *Inv* is the change in fixed assets (total assets minus current assets) net of depreciation. *dDebt* is the change in debt (including short-term debt and long-term liabilities), and *Issues* is the change in issued share capital. *ShDis* is the change in shareholder funds that is not due to net income for the period minus changes in issued share capital. All flow variables are computed as a fraction of aver-

age net assets of the year (the average of total assets minus current liabilities plus non-operational short-term liabilities at the end of a given year and the end of the previous year), all level variables are scaled by end of year net assets.[14]

Table II reports descriptive statistics for all flow variables of the investment and financing model, per country and type of ownership. Private firms exhibit higher average cash flows. This tendency can be observed in all countries except for Austria and Spain. Furthermore, our measure of profitability, EBITDA to sales, is significantly smaller and negative for public firms. All other investment and financing flow variables are comparable in magnitude.

[Insert Table II here]

We focus on the question how private and public firms differ in their use of cash flow. Therefore, we use a Fama-MacBeth regression (Fama and MacBeth, 1973) to calculate the average coefficients from nine[15] (2005-2014) annual cross-sectional regressions for each of the six channels a company can spend or compensate for cash flow independently:

$$dCash_{it} = \alpha_{it} + b_1\, Public_{it} + b_2\, CF_{it} + b_3\, (CF_{it} \times Public_{it}) + \sum Controls_{it} + \varepsilon_{it}$$

$$dNWC_{it} = \alpha_{it} + b_1\, Public_{it} + b_2\, CF_{it} + b_3\, (CF_{it} \times Public_{it}) + \sum Controls_{it} + \varepsilon_{it}$$

$$Inv_{it} = \alpha_{it} + b_1\, Public_{it} + b_2\, CF_{it} + b_3\, (CF_{it} \times Public_{it}) + \sum Controls_{it} + \varepsilon_{it}$$

$$dDebt_{it} = \alpha_{it} + b_1\, Public_{it} + b_2\, CF_{it} + b_3\, (CF_{it} \times Public_{it}) + \sum Controls_{it} + \varepsilon_{it}$$

$$Issues_{it} = \alpha_{it} + b_1\, Public_{it} + b_2\, CF_{it} + b_3\, (CF_{it} \times Public_{it}) + \sum Controls_{it} + \varepsilon_{it}$$

$$ShDis_{it} = \alpha_{it} + b_1\, Public_{it} + b_2\, CF_{it} + b_3\, (CF_{it} \times Public_{it}) + \sum Controls_{it} + \varepsilon_{it}$$

[14] Table A.I in the appendix provides a detailed variable definition.

[15] We lose two years from our initial sample by adding lagged sales growth as a control variable.

$Public_{it}$ is a dummy variable that is equal to 1 if firm *i* is publicly owned in period *t*, and 0 otherwise. CF_{it} is the cash flow of company *i* in period *t*. $Controls_{it}$ is a number of firm-level control variables that are added in the different models. To correct for autocorrelation, we calculate Newey-West adjusted standard errors with three lags (see Lewellen and Lewellen, 2014). We also follow Lewellen and Lewellen (2014) in not including firm-fixed effects because of the relatively short time-series for each company. In fact, due to the restrictions of the Amadeus database, the average series in our matched sample consists of only 6.7 years for private firms and 7.7 for public firms. Since we use lagged variables to explain investment and financing decisions, the length of the average series per firm further decreases. As shown by Stambaugh (1999) and Hjalmarsson (2008), short time-series per firm may severely bias estimates from fixed-effects panel regressions.

Our main test uses the deifferent specifications developed by Lewellen and Lewellen (2014), who study the investment-cash flow sensitivities of publicly traded U.S. firms. In order to measure the difference in sensitivities of the investment and financing variables towards cash flow and other control variables, we extend the model with interaction terms using the public company dummy variable. In addition, to account for absolute differences in the use of financing and investment instruments that can be attributed to the type of ownership, we also include the public company dummy as a separate variable in all regressions. As private firms are not publicly traded, we cannot calculate market-to-book ratios (*M/B*) for private firms to proxy for growth opportunities. Instead we use lagged sales growth as a proxy for investment opportunities, which is the conventional procedure.[16]

[16] See Mortal and Reisel (2013) and Asker, Farre-Mensa, and Ljungqvist (2014). For a discussion and evidence from simulation, see Whited (2006).

In estimating our investment and financing model, we use three different specifications. Model 1 is the basic specification, using a company's cash flow and growth opportunities to explain the level of investment and financing activities. In this specification, the estimation equation for investment is the following:

$$Inv_{it} = \alpha_{it} + b_1\, Public_{it} + b_2\, CF_{it} + b_3\, (CF_{it} \times Public_{it}) + b_4\, Sales\ growth_{it} + b_4\, (Sales\ growth_{it} \times Public_{it}) + \varepsilon_{it}$$

This basic specification is an extended version of the single-equation model proposed by Fazzari, Hubbard, and Petersen (1988) including interaction terms. Furthermore, Model 1 extends the isolated, investment-focused view of the single-equation model to six independent investment and financing equations to receive insights on how private and public firms differ in their reaction to changes in cash flow.

In Model 2, we add a set of control variables to account for other factors affecting a firm's investment and financing decisions. Lagged cash flow is added to the model to account for the intertemporal relationship of cash flow on investment. Firms might react with a time delay to increases of cash flow, and investments might take more than one period to be realized. We also add previous year debt levels and cash holdings to the equations to control for the existing financing condition of a company. Finally, we control for profitability by adding the current profit margin, EBITDA divide by sales, to the model alongside with two lags. While sales growth captures mere growth opportunities, the profit margin indicates how well a company has made use of these opportunities.

In Model 3 we replace both cash flow and lagged cash flow with unexpected and expected cash flow. Lewellen and Lewellen (2014) point to a problem in the use of lagged cash flow: firms exhibit strong persistence in their cash flow, that is, past cash flow has a high explanatory power for current cash flow.[17] Therefore, the effect of lagged cash flow on investment and financing is twofold. On the one hand, there is a direct effect, and firms simply react to changes in cash flow with a time delay. On the other hand, cash flow enables managers to anticipate future cash flow and to act on these expectations.

Lewellen and Lewellen (2014) propose a solution to this problem by differentiating between expected and unexpected cash flow. Expected cash flow is the anticipated cash flow that a manager – or anyone else with insight into the necessary information – would have derived from past. Unexpected cash flow is the difference between the actual level of cash flow and the expected level. Methodologically, expected cash flow is the fitted value from a regression of cash flow on the public company dummy variable, previous year's cash flow, previous year's sales growth, previous year's debt level and cash holdings, and the profit margins of the previous two years. We note that this extended version of the multivariate investment and financing model results in the same coefficient estimates for current period's cash flow and profit margin (and exactly the same R^2). This result holds because we do not add new information or variables to the estimation, but model expected cash flow as a linear combination of the lagged data in Model 2. By doing so, we control for the fact that past information does not only have a direct effect on current investment and financing decisions, but also exerts an indirect effect through the information it conveys for expected cash flow.

[17] In our sample, lagged cash flow explains 47% of the variation in current cash flow.

The estimated coefficients for all lagged variables and expected cash flow in Model 3 account for this twofold effect and, thus, do change.

B. Main results

Table III shows the results for our matched sample using the multi-equation model with all investment and financing flow variables as the dependent variables. Model 1 contains only current period's cash flow, lagged sales growth, and the public company dummy variable with interaction terms to explain the investment and financing behavior of and differences between private and public firms. In this basic model, private firms use almost a quarter of every additional dollar of cash flow for investment in fixed assets 20 cents) and net working capital (4 cents). Per definition, an increase (decrease) in working capital can either be caused by an increase (decrease) in current assets excluding cash or a reduction (increase) of non-debt current liabilities. Either way, working capital changes affect a firm's short-term operability. As Lewellen and Lewellen (2014) argue, these changes are a fraction of a company's total investment and thus play an important role when assessing investment behavior.

[Insert Table III here]

Private firms use 9 cents of every extra dollar of cash flow to reduce debt, while another 20 cents are used to increase cash holdings. Under the assumption of frictionless capital markets (Modigliani and Miller, 1958), there is no need for corporate managers to build up cash reserves. Whenever a positive net present value project emerges and sufficient internal cash flow is not available, the firm can tap the capital markets and raise external funds. Taking opportunity costs into account, holding cash would thus be inefficient. In markets with

frictions, however, cash is an important source of investment financing. In particular, if firms face capital markets access constraints, cash reserves become valuable since they can be used to undertake projects that otherwise could not be financed (Denis and Sibilkov, 2010).

We find no effect of cash flow on equity issues. This result confirms findings for public firms from Dasgupta, Noe, and Wang (2011), who show that firms use cash flow in the short-run to build up cash reserves and to reduce debt rather than to repurchase equity. This pattern suggests a pecking order behavior (Myers and Majluf, 1984) in the use of cash flow. However, we note that another reason for this finding could be the limitation of the Amadeus dataset. Amadeus does not provide information on dividends paid to shareholders or equity issued or repurchased, and thus we have to approximate issues, distributions, and repurchase from the firms' balance sheets. We chose a cautionary and restrictive definition of equity issues that only recognizes changes to the issued share capital. In our definition, a fraction of the flows that Lewellen and Lewellen (2014) assign to equity issues is captured under the definition of (negative) shareholder distributions. Given this difference, under our definition of shareholder distributions, we only capture a net position of funds that are either distributed to shareholders or shareholder contributions to the firm's equity (other than issued share capital). Although this approach tends to reduce our estimate for shareholder distributions, the largest fraction, almost 40 cents, of an extra dollar of cash flow in private firms is distributed to shareholder in our basic setting.

By including the public company dummy variable and interaction terms, we quantify the extent to which public firms allocate capital differently. Model 1 supports results from Mortal and Reisel (2013), as we find no evidence for different investment-cash flow sensitivities between private and public firms. Public firms' investments into net working capital are

more responsive to changes in cash flow, and public firms reduce debt to a smaller degree in reaction to an extra dollar of cash flow. However, the most pronounced difference is observed for shareholder distributions. Public firms distribute 24 cents less, or only 16 cent in total (the sum of the coefficients for CF_t, 0.397, and the interaction term $CF_t \times Public_t$, -0.242), of an extra dollar of cash flow to their shareholders. Our findings thus suggests that private firms' distribution policy is more aligned to economic performance (that is, to generated funds) than it is for public firms. This evidence supports results from Michaely and Roberts (2012), who find that dividends of public firms in the U.K. are less responsive to earnings compared to private firms. The preference of managers of public firms to smooth dividends was first documented by Lintner (1956) and was confirmed by Brav et al. (2005). Leary and Michaely (2011) further show that dividend smoothing tendencies increase with agency conflicts within a company. Considering these findings, we conclude that the lesser degree of information asymmetry between owners and managers in private firms provides a solution to inefficient distribution policies at the expense of the owners.

The estimates from the basic investment and financing model point to differences between private and public firms, which are especially pronounced in their working capital investment and distribution decisions. Although the sum of investment and financing flows or private firms add up to 93 cents per extra dollar of cash flow, a caveat of Model 1 is that we can only attribute 76 cents per extra dollar for public firms. One explanation is that the basic model does not account for the existing differences in the financial structure and the profitability of the private and public firms in our sample. By including in Model 2 the previous year's cash flow, leverage ratio, and cash holdings, we control for intertemporal effects of cash flow, the capital structure, and the financial position of the firm. In addition, Model 2

includes the current and the two previous profitability ratios to account for the effect profitability has on investment and financing decisions. These model extensions increase the sum of all investment and financing flows explaining the use of an extra dollar of cash flow from 76 to 92 cents for public firms, while this sum for private firms remains high at over 90 cents. Most importantly, we no longer observe any statistically significant investment-cash flow sensitivity for private firms after controlling for these additional factors; neither the cash flow coefficient for changes in net working capital nor that for investments in fixed assets is significant. We find a strong and positive link between lagged cash flow and investment, indicating an increase of 27 cents for every additional dollar of previous year's cash flow. A dollar of current period's cash flow is almost evenly used to increase cash holdings (31 cents), to retire debt (30 cents), and as distribution to shareholders (27 cents).

The estimates for public firms show a different cash flow allocation. Although the investment-cash flow sensitivity of public firms decreases in absolute terms from 25 cents to 17 cents, the difference between public and private firms increases and becomes significant (at the 1% level). Together with the additional 17 cents that public firms allocate to investments in their working capital, the difference in total investments increases from 18 cents in Model 1 to 32 cents in Model 2. Because we use a matched sample and control for differences in the total investment level and the growth opportunities of public and private firms, these findings strongly suggest a different relation between cash flow and investment spending in private and public firms.

Public firms use 13 cent less than their private counterparts to retire debt, suggesting that private firms have a stronger understanding of cash flow as a substitute for debt. The tendency to smooth dividends that we observed for public firms in Model 1 persists after con-

trolling for the additional factors in Model 2. Of every additional dollar of cash flow, public firms distribute only 10 cent to their shareholders, 17 cent less than private firms.

The results so far point to a different usage of cash flow in private and public firms. Public firms increase their total investment spending by over 30 cents more in response to changes in cash flow as compared to private firms. Since we observe all channels through which cash flow can be spent or compensated by in our multivariate model, we also show that private firms use the larger part of these 30 cents for shareholder distributions. Jensen (1989) points out that, as a direct consequence of agency problems between shareholders and managers, retaining free cash flow within the company rather than distributing it to shareholders may not lead to shareholder value maximization. In the next section, we thus separate cash flow into an expected and an unexpected part in order to gain further insight into these agency-related inefficiencies that persist in public firms.

C. Expected versus unexpected cash flow

Model 3 in Table III presents results from the regression model including unexpected and expected cash flows. Lewellen and Lewellen (2014) point out that the effect of lagged cash flow on investment is twofold. On the one hand, investment decision processes can be lengthy, and thus investment might only react with a time delay to changes in cash flow. On the other hand, cash flow is persistent and to some degree predictable. In order to account for this predictability in cash flow, we follow Lewellen and Lewellen (2014) and decompose our cash flow variable into an expected (E[CF_t]) part and an unexpected (U[CF_t]) part. As explained before, the estimates of unexpected cash flow in Model 3 are the same as of current period's cash flow in Model 2. This holds because we do not add any new information to

Model 3, but only remodel the lagged variables in Model 2 to account for the information they convey about expected cash flow.

We expect agency conflicts to be an important factor for firms' reaction to expected and unexpected cash flow, with substantially different uses of the two parts of cash flow. All data necessary to build an expectation about future cash flow is available to a company's management, but also to shareholders and, at least for public firms, to informed investors. Therefore, not only managers will possess an expectation about future cash flow, but also the owners of public and private firms alike. In addition, with respect to expected cash flow, owners likely also have specific expectations about the way management should use these funds. Given these assumptions, a positive unexpected cash flow can be understood as a windfall profit for the management to spend, while a negative unexpected cash flow puts pressure on the management for failing to meet expectations.

Managers of public firms underlie pressure to meet capital markets expectations and face the constant threat of shareholder choosing to sell their shares ("exit") or to be replaced ("voice"). Since the ties between management and ownership are closer in private firms, with the extreme case of an owner-manager, these threats are less severe. In the case of a positive unexpected cash flow, public company managers may pursue personal objectives leading to an inefficient allocation of the additional funds. One manifestation of this behavior may be excessive spending for unprofitable investments at the expense of shareholder distributions. In the negative case, managers may either forgo profitable investments or raise additional (external) funds to meet shareholders expectations, for example, to stabilize dividends. We have shown the allocation of cash flow to be significantly different for private firms than it is for public firms. We understand private firms as a benchmark for cash flow allocation in the

best interest of the owners due to the lesser degree of agency conflicts, thus enabling us to quantify the degree to which agency conflicts distort cash flow allocation in public firms. The resulting distortion is expected to be most pronounced for investment decisions and the smoothing of distributions to and contributions from shareholders.

As Model 2 has shown, private and public firms differ in their allocation of current and past cash flow. However, Model 2 only accounts for the direct effect of cash flow on investment and financing and neglects the indirect effect past information will likely have on expected cash flow. A priori, the results from Model 2 indicate a significantly different reaction between private and public firms to the unexpected part of cash flow. To capture the undiluted effect of expected cash flow, we extend Model 2 to capture the indirect effect of lagged variables on expected cash flow. Model 3 in Table III accounts for this indirect effect by modelling expected cash flow as a linear combination of past information. For private firms, the sensitivity of investment increases from 27 cents towards lagged cash flow to 41 cents towards expected cash flow. The increase is even more pronounced for dividends, for which we find an increase from 12 cents in reaction to changes in lagged cash flow to 45 cents in reaction to expected cash flow.[18] Most importantly, we find no differences in the reactions of any of the investment and financing channels to expected cash flow between private and public firms (as indicated by the insignificant estimates for the interaction term $E[CF_t] \times Public_t$), thus contradicting the results for lagged cash flow in Model 2.

Taken together, the results from Model 3 support our agency-based explanation. The role of information asymmetry in the reaction to expected cash flow is low because all neces-

[18] Lewellen and Lewellen (2014) report similarly large estimates for U.S. public firms. For example, the sensitivity of investment increases from 32 cents towards lagged cash flow to 68 cents towards expected cash flow.

sary information to build expectations has already been available to both management and owners. This is especially true for public firms, which are subject to strict disclosure regulations. Since public firms do not differ from private firms in their use of expected cash flow, and discretionary use of expected cash flow is limited by shareholders' expectations, we conclude that the larger degree of information asymmetry in public firms and the resulting agency conflicts can explain the higher (lower) cash flow sensitivities of public firms against investment (shareholder distributions) compared to private firms. In short, the statistical significance of the corresponding interaction terms in our multivariate model indicates distorted cash flow allocation in public firms.

V. Robustness checks

Our result show how public firms differ from private firms in their cash flow allocation. In particular, they indicate that public firms overinvest and smooth dividends compared to private firms. Since we use private firms as a benchmark for how firms allocate cash flow in the absence of agency conflicts, we conclude that these inefficiencies are driven by information asymmetries resulting from the separation of ownership and management. This hypothesis is supported by the results for expected and unexpected cash flow. In this section, we test alternative drivers that could explain our results and provide additional robustness tests to support our agency-based explanation.

A. Self-selection

One could argue that it is not so much the listing status that influences the allocation of cash flow, but that those managers pursuing personal objectives (empire building) prefer

the firm to be public. As a result, managers of efficient firms (in terms of cash flow allocation) may prefer their firms to remain private. To account for the potential endogeneity of the choice of firm status, we use a Heckman (1979) self-selection approach. First, we estimate a probit regression for the full sample with the public firm dummy as the left hand variable and the set of explanatory variables proposed by Mortal and Reisel (2013); in particular, the explanatory variables include sales growth, cash flow, size, debt level, the country stock market development index, and year as well as industry dummy variables. In the second step, we add the self-selection variable (inverse Mill's ratio) to all regression models tested in Table III. Table IV presents estimates for the public firm dummy variable, contemporary, lagged, expected, and unexpected cash flow, together with the interaction terms and the self-selection variable for Models 2 and 3.

[Insert Table IV here]

The results show evidence for self-selection behavior for all channels of cash flow except investment. Although the estimate for unexpected cash flow becomes significant in the investment regression in Model 3, the interaction term involving the public firm dummy variable remains significantly higher. Similarly, the coefficient for the self-selection variable is significant in the shareholder distribution regression, but the significantly smaller coefficient for unexpected cash flow for public firms persists.

B. Alternative proxies for investment opportunities

Growth opportunities are crucial for the assessment of investment opportunities. The standard investment model proposed by Fazzari, Hubbard, and Petersen (1988) regresses in-

vestment on Tobin's Q, to control for growth opportunities, and cash flow. Tobin's Q is often approximated by the market-to-book ratio (*M/B*) of a firm. Since we cannot observe actual market prices for the value of a private firm, we cannot calculate a market-to-book ratio and use sales growth as an alternative proxy. Although this is a standard procedure in the private firms' literature (Mortal and Reisel, 2013; Asker, Farre-Mensa, and Ljungqvist, 2014), one could argue that the effects we observe for cash flow are due to a misspecification of our measure of growth opportunities.

To mitigate this concern, we calculate a predicted market-to-book ratio for all firms. This approach is close to the *FundQ* approach proposed by Campello and Graham (2013).[19] To calculate the predicted *M/B*-ratio, we use the public firms' sample and regress their market-to-book ratio on a set of fundamental firm characteristics: current and lagged earnings (defined as EBITDA) as well as current and lagged sales growth.[20] We further include industry sales growth and investment to account for industry-wide effects. Both variables are calculated as the annual mean for the respective variable based on the Fama-French 48 classification. In a second step, we compute the predicted *M/B*-ratio as the fitted value for both types of firms, private and public, and incorporate the lagged value into our investment and financing model to replace sales growth.

[Insert Table V here]

Table V presents the results for the investment and financing model using the predicted *M/B*-ratio. The coefficients are comparable to those in Table III. The main findings, larger

[19] This approach was also used by Mortal and Reisel (2013) and Asker, Farre-Mensa, and Ljungqvist (2014) in the context of comparing private and public firms' investment behavior.

[20] We trim the *M/B*-ratio at the 95th percentile to account for outliers in the sample of public firms.

investment-cash flow sensitivity and lower sensitivity of shareholder distribution to cash flow for public firms, are very robust. Most importantly, we still find no difference in the response of investment or shareholder distributions to expected cash flow between private and public firms after replacing sales growth with predicted M/B-ratio, as indicated by the insignificant interaction terms. Overall, these robustness tests provide no evidence that a misspecified approximation of growth opportunities biases our results for cash flow.

VI. The effect of stock market development and ownership concentration

In this section, we provide additional insight that can help to explain the differences in the investment and financing behavior of private and public firms by separating our sample according to stock market development and ownership concentration on the country-level.

A. Stock market development

Access to organized public equity markets is the main distinction between private and public firms. The public trading of shares makes ownership liquid, i.e., easily transferable and dividable, compared to private firms. There are two opposing predictions on how stock market liquidity affects the efficiency of capital allocation by managers through monitoring. On the one hand, high liquidity allows for selling shares at lower transaction costs and with lower price impact. Since this decreases the threshold for large shareholders, who hold substantial blocks of shares, to sell their shares (exit) rather than monitor managers (voice), stock market liquidity disciplines managers (Admati and Pfleiderer, 2009). This hypothesis is supported by Fang, Noe, and Tice (2009), documenting a positive relation between stock liquidity and firm valuation (measured by the market-to-book ratio). On the other hand, Roosenboom, Schlinge-

mann, and Vasconcelos (2013) and Chatterje et al. (2015) show that managers of firms with highly liquid stocks overinvest in M&A transactions. The authors conclude that this "dark side" of liquidity reduces the incentives for shareholders to actively monitor managers and, eventually, induces managers to show empire building behavior.

We use the stock market development index proposed by Demirgüç-Kunt and Levine (1996) to proxy for country-level stock market liquidity. The index includes measures for the total size of the stock market as well as ratios to approximate turnover. We separate our sample into two subsamples to evaluate the effect liquidity exerts on the capital allocation of private and public firms. Following Mortal and Reisel (2013), we separate our matched sample into a sample of firms from countries with a stock market development above median and firms from countries with a stock market development below and equal to the median.[21] We estimate our multivariate investment and financing model separately for the two subsamples.

[Insert Table VI here]

The results for the high and low stock market development subsamples are shown in Table VI. We focus on Model 3 because it includes the distinction between expected and unexpected cash flow. We find that significant investment sensitivities of unexpected cash flow can only be observed for public firms operating in highly developed and liquid stock markets. In contrast, the interaction terms for both expected and unexpected investment-cash flow sensitivities of public firms are insignificant in less developed (and thus less liquid) stock markets. Our results are consistent with findings from Roosenboom, Schlingemann, and Vascon-

[21] Austria, Belgium, Germany, Greece, Ireland, and Italy are the countries in the low development group. Spain, Finland France, Great Britain and Sweden are in the high development group.

celos (2013) and Chatterje et al. (2015) in that unexpected investment-cash flow sensitivities are driven by the countries where high stock market liquidity distorts active investor monitoring. In addition, in highly developed stock markets, managers of public firms have a lower tendency to smooth dividends, as indicated by the larger (in absolute terms) estimate for the interaction term with unexpected cash flow in the shareholder distributions equation. This result also supports the argument of a dark side of liquidity. In particular, investors in highly developed and liquid stock markets interpret their role as shareholders more as anonymous investors, ensuring distributions from cash flow, rather than to actively monitor the long-term objective of making efficient value-maximizing investment decisions.

The results in Table VI suggest that the negative effect of liquid, tradeable ownership shares in public firms that leads to reduced investor monitoring outweighs the positive effect of disciplining management that makes large shareholders' exit option more credible. Our main findings are entirely driven by the countries in our sample with highly liquid and developed stock markets, thus supporting our agency-based monitoring hypothesis that private firms are less prone to overinvest because of a closer link between ownership and management.

B. Ownership concentration

To further test the hypothesis that it is the monitoring effect related to firms' ownership structures that drives the differences between private and public firms, we split our sample based on country-level ownership concentration. In particular, we use country-level data of ownership concentration provided by Faccio and Lang (2002) to distinguish between firms

from countries with ownership dispersion above and below as well as equal to the median.[22] We estimate our investment and financing model separately for the two country subsamples. Given the results so far, we expect public firms from countries with high ownership concentration to be less prone to inefficient cash flow allocation, and therefore the difference in the reaction of investment to unexpected cash flow between private and public firms to be smaller in these countries.

The results in Table VII confirm our previous findings. Most importantly, the difference in the investment sensitivity to unexpected cash flow between private and public firms (captured by the interaction term $U[CF_t] \times Public_t$) becomes insignificant for the group of countries with high ownership concentration, where monitoring incentives are high. For the group pf low ownership concentration countries, the difference between private and public firms remains significant (at the 10% level) at 17 cents per extra dollar of additional unexpected cash flow.

[Insert Table VII here]

VII. Conclusion

In this study, we compare the cash flow allocation of private and public firms. We create a matched sample by pairing private and public companies from the same country and industry and close in size. Using a multi-equation model that captures all channels through which a company can spend cash flow or compensate for a lack of cash flow, we find that

[22] Firms in the low ownership concentration sample are Spain, Finland, France, Great Britain Ireland, and Sweden. Firms with high ownership concentration are Austria, Belgium, Germany, France, and Italy. Faccio and Lang (2002) do not provide data for Greece.

private and public companies behave significantly different in the allocation of generated funds. Holding investment opportunities constant, and controlling for intertemporal effects of cash flow, capital structure, and profitability, public firms invest more per additional dollar of cash flow than their private counterparts. Furthermore, public companies distribute significantly less of their cash flow to shareholders. The tendency to inefficiently allocate capital, i.e. to overinvest and to smooth dividends, is evidence for the empire-building theory (Jensen, 1986), and points to agency costs of cash flow allocation that result from the separation of ownership and control of public companies.

We further separate cash flow into an expected and unexpected component to confirm our agency-based explanation. As cash flow is persistent, expected levels of cash flow can be derived from past information by managers and owners (or shareholders) alike. Consistent with our rationale, we find that investment and financing decisions in reaction to changes in cash flow are driven by the unexpected part of cash flow, while private and public firms react similarly to the expected part of cash flow. Because information asymmetries are low in predicting expected cash flow, this supports the agency-based theory.

We provide further evidence on why managers of public firms allocate cash flow inefficiently by separating our sample by stock market development, as a close proxy for liquidity, and ownership concentration on the country-level. Our results from the matched sample are only observable for countries with a highly developed, liquid stock market and low ownership concentration. These findings suggest that it is the lower degree of active monitoring of public firms in these countries that enable managers to overinvest. More generally, it is not only the mere separation of ownership and control but also the degree to which shareholders can transfer ownership at low cost that decreases monitoring of managers by their sharehold-

ers—this latter effect emphasizes a "dark side" of liquidity that eventually leads to inefficient cash flow allocation in public firms.

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Tables

Table I
Balance sheet data

This table presents balance sheet information for the full sample, the matched sample, and the matched sample restricted to the year each pair is formed. The matching procedure is explained in detail in the text. We retrieve data from Bureau van Dijk's Amadeus database. We restrict our sample to non-financial, non-utility firms from large Western European countries. All balance sheet items, except for total assets itself, are scaled by total assets and winsorized at the 0.5^{th} and 99.5^{th} percentile. The last column reports differences in means of the respective private and public sample. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Full sample

	Private		Public		
	Mean	N	Mean	N	Difference
Assets					
Fixed Assets	0.395	94,127	0.479	13,596	-0.084 ***
Intangibles	0.063	93,053	0.197	13,579	-0.134 ***
Tangibles	0.287	94,097	0.221	13,596	0.066 ***
Current Assets	0.605	94,133	0.521	13,599	0.084 ***
Cash	0.110	94,133	0.126	13,599	-0.016 ***
Total Assets in USD mil.	385.525	94,133	3479.447	13,599	-3,093.900 ***
Liabilities					
Shareholder Funds	0.384	94,133	0.462	13,599	-0.078 ***
Capital	0.058	94,133	0.135	13,599	-0.077 ***
Noncurrent-Liabilities	0.191	94,133	0.197	13,599	-0.006 ***
Long-Term Debt	0.140	89,883	0.134	13,169	0.006 ***
Current Liabilities	0.424	94,133	0.341	13,599	0.083 ***
Loans	0.109	94,133	0.075	13,599	0.034 ***

Panel B: Matched sample

	Private		Public		
	Mean	N	Mean	N	Difference
Assets					
Fixed Assets	0.412	7,373	0.466	9,253	-0.054 ***
Intangibles	0.079	7,339	0.202	9,243	-0.124 ***
Tangibles	0.283	7,371	0.208	9,253	0.076 ***
Current Assets	0.588	7,373	0.533	9,255	0.054 ***
Cash	0.122	7,373	0.127	9,255	-0.005 *
Total Assets in USD mil.	846.572	7,373	1110.261	9,255	-263.700 **
Liabilities					
Shareholder Funds	0.382	7,373	0.470	9,255	-0.088 ***
Capital	0.066	7,373	0.129	9,255	-0.064 ***
Noncurrent-Liabilities	0.212	7,373	0.184	9,255	0.029 ***
Long-Term Debt	0.141	7,183	0.124	8,984	0.017 ***
Current Liabilities	0.405	7,373	0.346	9,255	0.059 ***
Loans	0.109	7,373	0.073	9,255	0.036 ***

Panel C: Matched sample in formation year						
	Private		Public			
	Mean	N	Mean	N	Difference	
Assets						
Fixed Assets	0.413	1,376	0.484	1,376	-0.071	***
Intangibles	0.097	1,371	0.222	1,372	-0.125	***
Tangibles	0.261	1,375	0.197	1,376	0.063	***
Current Assets	0.587	1,376	0.515	1,376	0.071	***
Cash	0.122	1,376	0.128	1,376	-0.006	
Total Assets in USD mil.	867.675	1,376	988.113	1,376	-120.400	
Liabilities						
Shareholder Funds	0.375	1,376	0.471	1,376	-0.096	***
Capital	0.066	1,376	0.139	1,376	-0.073	***
Noncurrent-Liabilities	0.212	1,376	0.180	1,376	0.032	***
Long-Term Debt	0.144	1,334	0.122	1,320	0.022	***
Current Liabilities	0.413	1,376	0.349	1,376	0.064	***
Loans	0.113	1,376	0.074	1,376	0.039	***

Table II

Descriptive statistics

This table presents descriptive statistics for the most important input variables of the investment and financing model in the matched sample for private and public companies from 2003 to 2013. Means and observations are reported individually per group and pooled for the entire matched sample and per country. We retrieve data from Bureau van Dijk's Amadeus database. We restrict our sample to non-financial, non-utility firms from large Western European countries. Level variables are standardized by net assets, flow variables are standardized by average net assets of the year. For a detailed description of the variables refer to Table A.I in the appendix. All variables, except for sales growth, are winsorized at the 0.5^{th} and 99.5^{th} percentile. Sales growth is trimmed at the 95^{th} percentile.

	CF		dCash		dNWC		Investment		dDebt		Equity Issues		Shareh. Distr.		Profit		Debt		Cash		Sales Growth	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
All																						
Public	0.09	9,255	0.01	9,255	0.00	9,255	0.11	9,255	0.01	9,255	0.01	9,255	0.04	9,255	-0.10	9,254	0.35	9,255	0.19	9,255	0.05	9,254
Private	0.14	7,373	0.02	7,373	0.01	7,373	0.10	7,373	0.02	7,373	0.00	7,373	0.05	7,373	0.12	7,345	0.45	7,373	0.22	7,373	0.05	7,338
Total	0.12	16,628	0.01	16,628	0.01	16,628	0.10	16,628	0.01	16,628	0.00	16,628	0.04	16,628	0.00	16,599	0.39	16,628	0.20	16,628	0.05	16,592
Austria																						
Public	0.08	4	-0.04	4	0.22	4	-0.12	4	0.05	4	0.00	4	0.02	4	0.48	4	0.30	4	0.01	4	0.02	4
Private	0.08	11	0.02	11	0.00	11	0.09	11	0.03	11	0.00	11	0.02	11	0.29	11	0.62	11	0.15	11	0.03	11
Total	0.08	15	0.01	15	0.06	15	0.03	15	0.03	15	0.00	15	0.02	15	0.34	15	0.53	15	0.11	15	0.03	15
Belgium																						
Public	0.10	105	0.00	105	0.01	105	0.12	105	0.00	105	0.01	105	0.04	105	0.09	105	0.47	105	0.15	105	0.03	105
Private	0.14	78	0.01	78	0.03	78	0.14	78	0.04	78	0.01	78	0.03	78	0.11	78	0.37	78	0.16	78	0.10	78
Total	0.11	183	0.00	183	0.02	183	0.13	183	0.02	183	0.01	183	0.03	183	0.10	183	0.43	183	0.15	183	0.06	183
Germany																						
Public	0.10	1,488	0.01	1,488	0.00	1,488	0.10	1,488	0.01	1,488	0.00	1,488	0.03	1,488	0.06	1,488	0.38	1,488	0.19	1,488	0.05	1,488
Private	0.13	1,119	0.01	1,119	0.00	1,119	0.10	1,119	0.00	1,119	0.00	1,119	0.04	1,119	0.10	1,119	0.50	1,119	0.17	1,119	0.05	1,119
Total	0.11	2,607	0.01	2,607	0.00	2,607	0.10	2,607	0.00	2,607	0.00	2,607	0.04	2,607	0.08	2,607	0.43	2,607	0.18	2,607	0.05	2,607
Spain																						
Public	0.11	345	0.01	345	0.00	345	0.11	345	0.04	345	0.00	345	0.05	345	0.15	345	0.44	345	0.13	345	0.05	345
Private	0.09	293	0.00	293	0.02	293	0.08	293	0.03	293	0.00	293	0.03	293	0.11	293	0.47	293	0.12	293	0.05	293
Total	0.10	638	0.00	638	0.01	638	0.10	638	0.03	638	0.00	638	0.04	638	0.13	638	0.45	638	0.12	638	0.05	638
Finland																						
Public	0.12	339	0.01	339	-0.01	339	0.11	339	0.01	339	0.00	339	0.05	339	0.09	339	0.35	339	0.15	339	0.05	339
Private	0.14	261	0.01	261	0.01	261	0.10	261	0.01	261	0.00	261	0.04	261	0.11	261	0.39	261	0.16	261	0.05	261
Total	0.13	600	0.01	600	0.00	600	0.10	600	0.01	600	0.00	600	0.05	600	0.10	600	0.37	600	0.15	600	0.05	600

	CF		dCash		dNWC		Investment		dDebt		Equity Issues		Shareh. Distr.		Profit		Debt		Cash		Sales Growth	
France																						
Public	0.11	1,352	0.02	1,352	0.01	1,352	0.11	1,352	0.02	1,352	0.01	1,352	0.03	1,352	0.10	1,352	0.33	1,352	0.27	1,352	0.07	1,352
Private	0.15	929	0.02	929	0.00	929	0.12	929	0.02	929	0.00	929	0.04	929	0.09	902	0.42	929	0.34	929	0.04	896
Total	0.12	2,281	0.02	2,281	0.01	2,281	0.12	2,281	0.02	2,281	0.00	2,281	0.04	2,281	0.10	2,254	0.37	2,281	0.30	2,281	0.06	2,248
Great Britain																						
Public	0.10	3,530	0.01	3,530	0.00	3,530	0.12	3,530	0.01	3,530	0.01	3,530	0.04	3,530	-0.31	3,530	0.31	3,530	0.19	3,530	0.05	3,530
Private	0.15	2,899	0.02	2,899	0.01	2,899	0.09	2,899	0.02	2,899	0.00	2,899	0.06	2,899	0.13	2,899	0.41	2,899	0.24	2,899	0.06	2,899
Total	0.12	6,429	0.02	6,429	0.01	6,429	0.11	6,429	0.02	6,429	0.00	6,429	0.05	6,429	-0.11	6,429	0.36	6,429	0.21	6,429	0.06	6,429
Greece																						
Public	0.03	674	0.00	674	0.00	674	0.04	674	0.02	674	0.00	674	0.03	674	-0.06	674	0.51	674	0.09	674	-0.01	674
Private	0.08	480	0.00	480	0.01	480	0.07	480	0.02	480	0.01	480	0.04	480	0.10	480	0.56	480	0.13	480	0.00	480
Total	0.05	1,154	0.00	1,154	0.00	1,154	0.05	1,154	0.02	1,154	0.00	1,154	0.03	1,154	0.01	1,154	0.53	1,154	0.10	1,154	-0.01	1,154
Ireland																						
Public	0.08	83	-0.01	83	-0.01	83	0.09	83	-0.02	83	0.01	83	0.04	83	-0.04	83	0.26	83	0.24	83	0.04	83
Private	0.11	72	0.00	72	0.02	72	0.10	72	0.01	72	0.00	72	0.05	72	0.11	72	0.36	72	0.23	72	0.01	72
Total	0.10	155	0.00	155	0.00	155	0.10	155	0.00	155	0.01	155	0.04	155	0.03	155	0.31	155	0.24	155	0.02	155
Italy																						
Public	0.09	764	0.00	764	0.00	764	0.09	764	0.02	764	0.00	764	0.03	764	0.09	764	0.45	764	0.15	764	0.03	764
Private	0.11	608	0.01	608	0.01	608	0.11	608	0.02	608	0.00	608	0.03	608	0.13	608	0.52	608	0.13	608	0.05	608
Total	0.10	1,372	0.01	1,372	0.00	1,372	0.10	1,372	0.02	1,372	0.00	1,372	0.03	1,372	0.11	1,372	0.48	1,372	0.14	1,372	0.04	1,372
Sweden																						
Public	0.06	571	0.02	571	-0.01	571	0.11	571	0.00	571	0.01	571	0.06	571	-0.27	570	0.21	571	0.26	571	0.05	570
Private	0.21	623	0.01	623	0.02	623	0.10	623	0.01	623	0.00	623	0.10	623	0.10	622	0.43	623	0.29	623	0.06	621
Total	0.14	1,194	0.02	1,194	0.00	1,194	0.10	1,194	0.00	1,194	0.00	1,194	0.08	1,194	-0.07	1,192	0.32	1,194	0.27	1,194	0.05	1,191

Table III

Investment and financing model

This table shows average results from annual cross-sectional regressions (with intercepts) over the period 2003-2013 for our matched sample. The reported t-statistics are Newey-West corrected with three lags. We retrieve data from Bureau van Dijk's Amadeus database. We restrict our sample to non-financial, non-utility firms from large Western European countries. Level variables are standardized by net assets, flow variables are standardized by average net assets of the year. For a detailed description of the variables refer to Table A.I in the appendix. All input variables are winsorized annually at the 0.5^{th} and 99.5^{th} percentile. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Model 1												
	dCash		dNWC		Investment		dDebt		Equity Issues		Shareholder Distributions	
$Public_t$	0.008	*	-0.020	***	0.013		-0.011	***	0.003	**	0.028	***
	(2.24)		(10.26)		(1.05)		(4.36)		(2.36)		(12.08)	
CF_t	0.200	***	0.043	*	0.203	***	-0.089	***	-0.001		0.397	***
	(5.59)		(1.88)		(11.30)		(4.30)		(0.47)		(19.65)	
CF_t x $Public_t$	-0.043		0.132	***	0.046		0.078	**	-0.015		-0.242	***
	(1.15)		(10.27)		(1.17)		(2.77)		(1.69)		(11.11)	
Sales $Growth_{t-1}$	0.021	**	0.043	***	0.066	**	0.092	**	0.001		-0.031	*
	(2.56)		(4.82)		(3.32)		(2.39)		(0.54)		(2.01)	
Sales $Growth_{t-1}$ x $Public_t$	-0.032		-0.028	**	-0.003		-0.031		0.000		0.012	
	(1.66)		(3.23)		(0.11)		(0.73)		(0.02)		(0.63)	
N	13,111		13,111		13,111		13,111		13,111		13,111	
R-sq	0.052		0.029		0.075		0.018		0.017		0.231	
Private: Sum of Financing and Investment: 0.93												
Public: Sum of Financing and Investment: 0.76												

Model 2

	dCash		dNWC		Investment		dDebt		Equity Issues		Shareholder Distributions	
$Public_t$	0.014		-0.027	**	0.043	***	0.008		0.007	**	0.021	**
	(1.16)		(3.14)		(6.56)		(1.56)		(2.39)		(2.91)	
CF_t	0.313	***	0.022		0.014		-0.291	***	0.001		0.266	***
	(5.68)		(0.44)		(0.49)		(7.55)		(0.37)		(18.73)	
CF_t x $Public_t$	-0.019		0.169	**	0.153	***	0.125	***	-0.007		-0.170	***
	(0.36)		(2.68)		(3.96)		(5.89)		(0.29)		(19.23)	
CF_{t-1}	-0.143	**	-0.008		0.268	***	0.212	***	-0.002	*	0.126	*
	(3.06)		(0.12)		(4.39)		(8.54)		(2.06)		(2.14)	
CF_{t-1} x $Public_t$	-0.022		-0.056		-0.148	***	-0.064	*	-0.016		-0.003	
	(0.25)		(0.65)		(3.60)		(2.24)		(0.50)		(0.03)	
Sales $Growth_{t-1}$	0.036	*	0.060	***	0.029	***	0.068	*	0.002		-0.040	*
	(2.01)		(4.57)		(4.98)		(2.17)		(1.81)		(2.36)	
Sales $Growth_{t-1}$ x $Public_t$	-0.005		-0.022	*	0.035		0.004		0.007		0.014	
	(0.42)		(2.23)		(1.84)		(0.45)		(1.70)		(0.80)	
$DEBT2_{t-1}$	-0.023		-0.024	***	0.035	***	-0.060	***	0.006	**	-0.027	**
	(1.75)		(4.18)		(4.79)		(9.26)		(2.59)		(2.87)	
$DEBT2_{t-1}$ x $Public_t$	-0.013	*	0.008		-0.072	***	-0.041	***	-0.007	*	-0.002	
	(2.11)		(1.09)		(9.84)		(6.28)		(2.18)		(0.34)	
$CASH_{t-1}$	-0.046		0.015		0.019	***	0.010		0.002		0.024	**
	(1.49)		(0.43)		(3.91)		(1.07)		(1.43)		(3.15)	
$CASH_{t-1}$ x $Public_t$	-0.042		0.035		-0.005		-0.035		0.000		0.002	
	(1.34)		(1.22)		(0.42)		(1.70)		(0.03)		(0.18)	
$Profit_t$	-0.048		0.150	***	0.193	***	0.125	***	0.001		-0.118	***
	(1.18)		(7.25)		(4.31)		(6.03)		(0.08)		(6.27)	
$Profit_t$ x $Public_t$	0.026		-0.138	***	-0.174	***	-0.105	***	0.006		0.105	***
	(0.74)		(7.59)		(8.78)		(4.56)		(0.61)		(5.82)	
$Profit_{t-1}$	-0.013		0.000		-0.193	***	-0.107	***	0.001		0.064	**
	(0.32)		(0.00)		(4.08)		(4.19)		(0.12)		(2.38)	
$Profit_{t-1}$ x $Public_t$	0.038		-0.026		0.193	***	0.077	**	-0.008		-0.082	*
	(0.73)		(0.38)		(5.83)		(2.97)		(1.21)		(2.13)	
$Profit_{t-2}$	0.035		-0.127	*	0.023		0.029		-0.006		0.075	***
	(0.57)		(1.91)		(1.23)		(0.94)		(0.60)		(5.73)	
$Profit_{t-2}$ x $Public_t$	-0.039		0.127		-0.022		0.018		0.002		-0.056	***
	(0.55)		(1.68)		(1.24)		(0.51)		(0.17)		(4.53)	
N	10,220		10,220		10,220		10,220		10,220		10,220	
R-sq	0.121		0.069		0.128		0.075		0.060		0.284	

Private: Sum of Financing and Investment: 0.91
Public: Sum of Financing and Investment: 0.92

Model 3

	dCash		dNWC		Investment		dDebt		Equity Issues		Shareholder Distributions	
$Public_t$	0.013		-0.026	*	0.050	***	0.012	*	0.007	**	0.023	*
	(0.88)		(2.22)		(6.23)		(2.16)		(2.68)		(2.31)	
$U[CF_t]$	0.313	***	0.022		0.014		-0.291	***	0.001		0.266	***
	(5.68)		(0.44)		(0.49)		(7.55)		(0.37)		(18.73)	
$U[CF_t]$ x $Public_t$	-0.019		0.169	**	0.153	***	0.125	***	-0.007		-0.170	***
	(0.36)		(2.68)		(3.96)		(5.89)		(0.29)		(19.23)	
$E[CF_t]$	0.099	*	0.009		0.415	***	0.025		-0.002		0.453	***
	(2.00)		(0.13)		(6.48)		(0.42)		(1.16)		(4.60)	
$E[CF_t]$ x $Public_t$	-0.051		0.086		-0.068		0.030		-0.030		-0.174	
	(0.60)		(1.24)		(0.98)		(0.54)		(1.16)		(1.45)	
Sales $Growth_{t-1}$	0.038	*	0.060	***	0.026	***	0.065	*	0.002		-0.042	**
	(2.10)		(4.38)		(4.43)		(2.08)		(1.83)		(2.37)	
Sales $Growth_{t-1}$ x $Public_t$	-0.005		-0.021	*	0.036	*	0.005		0.007		0.015	
	(0.39)		(2.04)		(1.91)		(0.51)		(1.74)		(0.76)	
$DEBT2_{t-1}$	-0.021		-0.024	***	0.031	***	-0.063	***	0.006	**	-0.029	**
	(1.63)		(4.26)		(4.26)		(10.00)		(2.60)		(3.32)	
$DEBT2_{t-1}$ x $Public_t$	-0.013	**	0.009		-0.070	***	-0.040	***	-0.006	*	-0.002	
	(2.37)		(1.08)		(9.35)		(6.43)		(2.06)		(0.39)	
$CASH_{t-1}$	-0.039		0.015		0.006		-0.001		0.002		0.018	
	(1.28)		(0.46)		(1.31)		(0.06)		(1.50)		(1.78)	
$CASH_{t-1}$ x $Public_t$	-0.041		0.038		0.002		-0.032		0.001		0.002	
	(1.41)		(1.47)		(0.18)		(1.45)		(0.05)		(0.15)	
$Profit_t$	-0.048		0.150	***	0.193	***	0.125	***	0.001		-0.118	***
	(1.18)		(7.25)		(4.31)		(6.03)		(0.08)		(6.27)	
$Profit_t$ x $Public_t$	0.026		-0.138	***	-0.174	***	-0.105	***	0.006		0.105	***
	(0.74)		(7.59)		(8.78)		(4.56)		(0.61)		(5.82)	
$Profit_{t-1}$	-0.014		0.000		-0.192	***	-0.106	***	0.001		0.065	**
	(0.35)		(0.00)		(4.07)		(4.15)		(0.12)		(2.45)	
$Profit_{t-1}$ x $Public_t$	0.038		-0.026		0.192	***	0.076	**	-0.008		-0.082	*
	(0.74)		(0.39)		(5.82)		(2.97)		(1.21)		(2.16)	
$Profit_{t-2}$	0.039		-0.127	*	0.015		0.024		-0.005		0.071	***
	(0.63)		(1.96)		(0.87)		(0.75)		(0.60)		(5.12)	
$Profit_{t-2}$ x $Public_t$	-0.039		0.128		-0.018		0.019		0.003		-0.056	***
	(0.55)		(1.75)		(1.01)		(0.57)		(0.21)		(4.81)	
N	10,220		10,220		10,220		10,220		10,220		10,220	
R-sq	0.121		0.069		0.128		0.075		0.060		0.284	

Private: Sum of Financing and Investment: 0.91
Public: Sum of Financing and Investment: 0.92

Table IV

Self-selection model

This table shows extracts from averages of annual cross-sectional regressions (with intercepts) over the period 2004 – 2013 for the matched sample. The reported t-statistics were Newey-West corrected with three lags. We retrieve data from Bureau van Dijk's Amadeus database. We restrict our sample to non-financial, non-utility firms from large Western European countries. Level variables are standardized by net assets, flow variables are standardized by average net assets of the year. For a detailed description of the variables refer to Table A.I in the appendix. In this table, we control for self-selection using a two-step Heckman model. The first step Probit regression includes sales growth, cash flow, size, debt level, a country stock market development index, and year and industry dummies. All input variables are winsorized annually at the 0.5^{th} and 99.5^{th} percentile. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively

Model 2

	dCash		dNWC		Investment		dDebt		Equity Issues		Shareholder Distributions	
$Public_t$	0.006	**	-0.019	**	0.039	***	0.021	***	0.005	*	0.036	***
	(2.67)		(2.99)		(4.20)		(3.70)		(1.93)		(8.73)	
CF_t	0.311	***	-0.003		0.073	***	-0.304	***	0.002		0.252	***
	(26.73)		(0.12)		(6.68)		(8.01)		(0.97)		(61.54)	
CF_t x $Public_t$	-0.069	*	0.190	***	0.166	***	0.195	**	-0.012		-0.176	***
	(1.94)		(6.58)		(5.16)		(3.23)		(0.52)		(20.75)	
CF_{t-1}	-0.128	***	0.004		0.189	***	0.195	***	0.000		0.148	***
	(19.57)		(0.31)		(6.17)		(8.00)		(0.17)		(9.63)	
CF_{t-1} x $Public_t$	0.007		-0.061		-0.128	**	-0.068	**	-0.019		-0.024	
	(0.22)		(1.28)		(2.67)		(2.40)		(0.73)		(0.87)	
Self Selection $Variable_t$	-0.004	*	0.020	***	-0.004		0.038	***	-0.003	***	0.013	***
	(2.13)		(6.51)		(1.85)		(16.48)		(7.88)		(10.83)	
N	59,686		59,686		59,686		59,686		59,686		59,686	
R-sq	0.082		0.038		0.088		0.060		0.051		0.321	

Model 3

	dCash		dNWC		Investment		dDebt		Equity Issues		Shareholder Distributions	
$Public_t$	0.004		-0.018	**	0.044	***	0.025	***	0.005	*	0.039	***
	(1.49)		(2.87)		(4.27)		(4.03)		(2.19)		(9.20)	
$U[CF_t]$	0.311	***	-0.003		0.073	***	-0.304	***	0.002		0.252	***
	(26.73)		(0.12)		(6.68)		(8.01)		(0.97)		(61.54)	
$U[CF_t]$ x $Public_t$	-0.069	*	0.190	***	0.166	***	0.195	**	-0.012		-0.176	***
	(1.94)		(6.58)		(5.16)		(3.23)		(0.52)		(20.75)	
$E[CF_t]$	0.123	***	0.003		0.353	***	-0.015	**	0.002		0.472	***
	(9.12)		(0.11)		(8.88)		(2.86)		(1.17)		(18.65)	
$E[CF_t]$ x $Public_t$	-0.059	***	0.100	*	-0.023		0.095	**	-0.040	*	-0.212	***
	(3.50)		(2.28)		(0.49)		(2.49)		(2.26)		(4.76)	
Self Selection $Variable_t$	-0.004	*	0.020	***	-0.004		0.038	***	-0.003	***	0.013	***
	(2.13)		(6.51)		(1.85)		(16.48)		(7.88)		(10.83)	
N	59,686		59,686		59,686		59,686		59,686		59,686	
R-sq	0.082		0.038		0.088		0.060		0.051		0.321	

Table V

Predicted market to book ratio as a measure of growth opportunities

This table shows extracts from averages of annual cross-sectional regressions (with intercepts) over the period 2003 – 2013 for the matched sample. The reported t-statistics were Newey-West corrected with three lags. We retrieve data from Bureau van Dijk's Amadeus database. We restrict our sample to non-financial, non-utility firms from large Western European countries. Level variables are standardized by net assets, flow variables are standardized by average net assets of the year. For a detailed description of the variables refer to Table A.I in the appendix. In this table, we replace sales growth with predicted market to book ratios to control for a misspecification of our proxy for growth opportunities. Predicted market to book (MB) is the fitted value from a regression of public firms' MB on current and lagged earnings (EBITDA), current and lagged sales growth, as well as current and lagged industry sales growth and investment. Details are presented in the text. All input variables are winsorized annually at the 0.5^{th} and 99.5^{th} percentile. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Model 2

	dCash		dNWC		Investment		dDebt		Equity Issues	Shareholder Distributions	
$Public_t$	0.016		0.045		-0.035		0.031		-0.016	0.032	
	(1.15)		(1.07)		(0.98)		(0.94)		(1.08)	(1.17)	
CF_t	0.300	***	0.013		0.001		-0.314	***	-0.002	0.268	***
	(6.05)		(0.27)		(0.04)		(7.26)		(1.66)	(27.83)	
CF_t x $Public_t$	0.000		0.173	**	0.136	**	0.133	***	-0.010	-0.160	***
	(0.00)		(2.91)		(2.88)		(5.70)		(0.45)	(14.03)	
CF_{t-1}	-0.111	**	-0.055		0.220	**	0.161	***	0.000	0.131	**
	(2.39)		(0.69)		(3.02)		(7.56)		(0.19)	(2.96)	
CF_{t-1} x $Public_t$	-0.029		-0.019		-0.174	**	-0.053		-0.025	0.006	
	(0.30)		(0.20)		(2.85)		(1.66)		(0.79)	(0.07)	
Predicted MB_{t-1}	-0.016		0.087	**	0.073	***	0.106	**	0.000	-0.023	
	(1.06)		(2.44)		(4.92)		(3.24)		(0.40)	(0.96)	
Predicted MB_{t-1} x $Public_t$	-0.002		-0.060		0.065		-0.020		0.019	-0.011	
	(0.12)		(1.59)		(1.81)		(0.68)		(1.67)	(0.44)	
N	10,207		10,207		10,207		10,207		10,207	10,207	
R-sq	0.116		0.069		0.131		0.073		0.063	0.287	

Model 3

	dCash		dNWC		Investment		dDebt		Equity Issues	Shareholder Distributions	
$Public_t$	0.005		0.038		-0.082		0.018		-0.023	0.036	
	(0.16)		(0.60)		(1.68)		(0.44)		(1.16)	(0.93)	
$U[CF_t]$	0.300	***	0.013		0.001		-0.314	***	-0.002	0.268	***
	(6.05)		(0.27)		(0.04)		(7.26)		(1.66)	(27.83)	
$U[CF_t]$ x $Public_t$	0.000		0.173	**	0.136	**	0.133	***	-0.010	-0.160	***
	(0.00)		(2.91)		(2.88)		(5.70)		(0.45)	(14.03)	
$E[CF_t]$	0.093		-0.089		0.411	***	-0.015		-0.001	0.512	***
	(1.42)		(0.73)		(3.65)		(0.21)		(0.35)	(5.75)	
$E[CF_t]$ x $Public_t$	-0.055		0.139		-0.188		0.033		-0.056	-0.149	
	(0.41)		(1.09)		(1.38)		(0.45)		(1.43)	(0.94)	
Predicted MB_{t-1}	0.015		0.102		0.012		0.061		0.000	-0.059	***
	(0.69)		(1.85)		(0.35)		(1.65)		(0.38)	(3.81)	
Predicted MB_{t-1} x $Public_t$	0.006		-0.055		0.113	*	-0.005		0.026	-0.012	
	(0.15)		(0.91)		(2.24)		(0.13)		(1.59)	(0.31)	
N	10,207		10,207		10,207		10,207		10,207	10,207	
R-sq	0.116		0.069		0.131		0.073		0.063	0.287	

Table VI

Stock market development and investment

This table shows an extract from the average results from annual cross-sectional regressions (with intercepts) over the period 2003 – 2013 for our matched sample. The reported t-statistics were Newey-West corrected with three lags. We retrieve data from Bureau van Dijk's Amadeus database. We restrict our sample to non-financial, non-utility firms from large Western European countries. The sample is divided by country-level stock market development. Firms in the high (low) group are registered in countries with a stock market development above (below and equal to) the median. Level variables are standardized by net assets, flow variables are standardized by average net assets of the year. For a detailed description of the variables refer to Table A.I in the appendix. All input variables are winsorized annually at the 0.5^{th} and 99.5^{th} percentile. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Model 3

	dCash		dNWC		Investment		dDebt		Equity Issues		Shareholder Distributions	
	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low
$Public_t$	0.016	0.001	-0.035 *	0.002	0.063 ***	-0.006	0.013	0.007	0.007	0.007 *	0.029 **	0.009
	(0.87)	(0.13)	(2.18)	(0.11)	(6.29)	(0.34)	(1.50)	(1.10)	(1.75)	(2.00)	(2.84)	(0.62)
$U[CF_t]$	0.303 ***	0.316 **	0.047	-0.003	0.018	-0.073	-0.275 ***	-0.347 **	0.001	0.002	0.253 ***	0.337 ***
	(5.18)	(3.11)	(0.96)	(0.02)	(1.02)	(0.73)	(9.06)	(2.74)	(0.56)	(0.23)	(11.14)	(6.99)
$U[CF_t]$ x $Public_t$	-0.036	0.065	0.073	0.298	0.201 ***	0.052	0.125 ***	0.125	-0.009	0.031	-0.142 ***	-0.212 ***
	(0.73)	(0.93)	(0.98)	(1.80)	(4.40)	(0.56)	(5.79)	(1.38)	(0.69)	(0.73)	(5.71)	(4.90)
$E[CF_t]$	0.099 *	0.110 *	*-0.018*	0.084	0.438 ***	0.340 ***	0.016	0.114 *	0.000	-0.008	0.457 ***	0.457 ***
	(1.99)	(1.94)	(0.25)	(1.35)	(6.96)	(4.97)	(0.23)	(2.31)	(0.11)	(1.43)	(4.20)	(13.65)
E[CFt] x $Public_t$	-0.037	-0.044	0.128	0.014	-0.098	0.058	0.044	-0.071 **	-0.038	-0.005	-0.219 *	-0.093
	(0.49)	(0.73)	(1.42)	(0.24)	(1.44)	(0.55)	(0.80)	(2.57)	(1.19)	(0.10)	(2.19)	(0.95)
Sales $Growth_{t-1}$	0.043	-0.017	0.061 **	0.080 *	0.013 **	-0.033	0.061 *	-0.009	0.003 **	-0.001	-0.035	-0.054 **
	(1.54)	(0.96)	(3.46)	(2.16)	(3.02)	(0.43)	(1.96)	(0.09)	(2.47)	(0.54)	(1.65)	(3.43)
Sales $Growth_{t-1}$ x $Public_t$	-0.004	0.038	-0.034	-0.016	0.046	0.096	0.015 *	0.093	-0.002	0.014 ***	0.016	0.023
	(0.19)	(1.21)	(1.81)	(0.39)	(1.47)	(1.47)	(1.94)	(1.03)	(0.36)	(4.33)	(0.97)	(1.69)
N	6,729	3,491	6,729	3,491	6,729	3,491	6,729	3,491	6,729	3,491	6,729	3,491
R-sq	0.13	0.22	0.07	0.18	0.14	0.17	0.08	0.12	0.07	0.18	0.28	0.39

Table VII

Ownership concentration and investment

This table shows an extract from the average results from annual cross-sectional regressions (with intercepts) over the period 2003 – 2013 for our matched sample. The reported t-statistics were Newey-West corrected with three lags. We retrieve data from Bureau van Dijk's Amadeus database. We restrict our sample to non-financial, non-utility firms from large Western European countries. The sample is divided by country-level ownership concentration. Firms in the low (high) group are registered in countries with ownership dispersion above (below and equal to) the median. Level variables are standardized by net assets, flow variables are standardized by average net assets of the year. For a detailed description of the variables refer to Table A.I in the appendix. All input variables are winsorized annually at the 0.5^{th} and 99.5^{th} percentile. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Model 3

	dCash		dNWC		Investment		dDebt		Equity Issues		Shareholder Distributions	
	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High
$Public_t$	0.028	-0.007	-0.043	-0.017	0.054 ***	0.065 **	0.011	0.016 *	0.006	0.006 **	0.034 ***	-0.006
	(1.05)	(0.50)	(1.51)	(1.08)	(4.33)	(2.89)	(0.92)	(2.29)	(1.36)	(3.08)	(4.73)	(0.29)
$U[CF_t]$	0.306 ***	0.570 **	0.030	-0.134	-0.026	0.136 **	-0.291 ***	-0.269 ***	0.001	0.005	0.274 ***	0.144 **
	(4.30)	(2.40)	(0.41)	(0.62)	(1.07)	(2.44)	(8.07)	(8.01)	(0.42)	(0.99)	(11.05)	(3.48)
$U[CF_t]$ x $Public_t$	0.000	-0.250	0.094	0.330	0.166 **	0.033	0.159 ***	0.065 *	-0.018	0.031	-0.156 ***	-0.028
	(0.00)	(1.12)	(1.04)	(1.41)	(2.96)	(0.95)	(5.99)	(1.98)	(1.13)	(0.71)	(5.52)	(0.80)
$E[CF_t]$	0.112	-0.158	0.024	0.197	0.339 ***	0.594 **	0.009	0.046	0.000	-0.008 *	0.502 ***	0.314 **
	(1.84)	(0.83)	(0.35)	(0.82)	(21.64)	(2.75)	(0.12)	(1.65)	(0.13)	(2.09)	(5.36)	(2.75)
E[CFt] x $Public_t$	-0.020	0.180	0.088	-0.108	-0.090	-0.061	0.040	0.069	-0.037	0.014	-0.259 **	0.004
	(0.22)	(1.10)	(1.08)	(0.43)	(1.42)	(0.27)	(0.73)	(1.87)	(0.95)	(0.46)	(2.98)	(0.02)
Sales $Growth_{t-1}$	0.038	-0.056	0.047 *	0.169 *	0.037 **	-0.005	0.054 *	0.074 *	0.003 *	0.000	-0.051 ***	-0.017
	(1.40)	(0.75)	(2.25)	(2.05)	(3.42)	(0.26)	(1.93)	(2.21)	(1.96)	(0.22)	(3.93)	(1.03)
Sales $Growth_{t-1}$ x $Public_t$	-0.002	0.091	-0.033	-0.110	0.042	0.041	0.017 *	0.001	0.001	0.009 *	0.034 ***	-0.013
	(0.11)	(1.17)	(1.57)	(1.57)	(1.40)	(0.82)	(1.95)	(0.09)	(0.12)	(2.16)	(3.61)	(0.71)
N	5,440	3,993	5,440	3,993	5,440	3,993	5,440	3,993	5,440	3,993	5,440	3,993
R-sq	0.16	0.15	0.09	0.11	0.13	0.22	0.09	0.09	0.09	0.13	0.31	0.28

Figures

Figure I. *Size distribution of the full and matched sample.* The left graph shows kernel densities of size of the full combined sample of firms. The right graph shows kernel densities of size of the matched sample. Details on the matching algorithm are presented in the text. Size is the natural logarithm of total assets in USD millions.

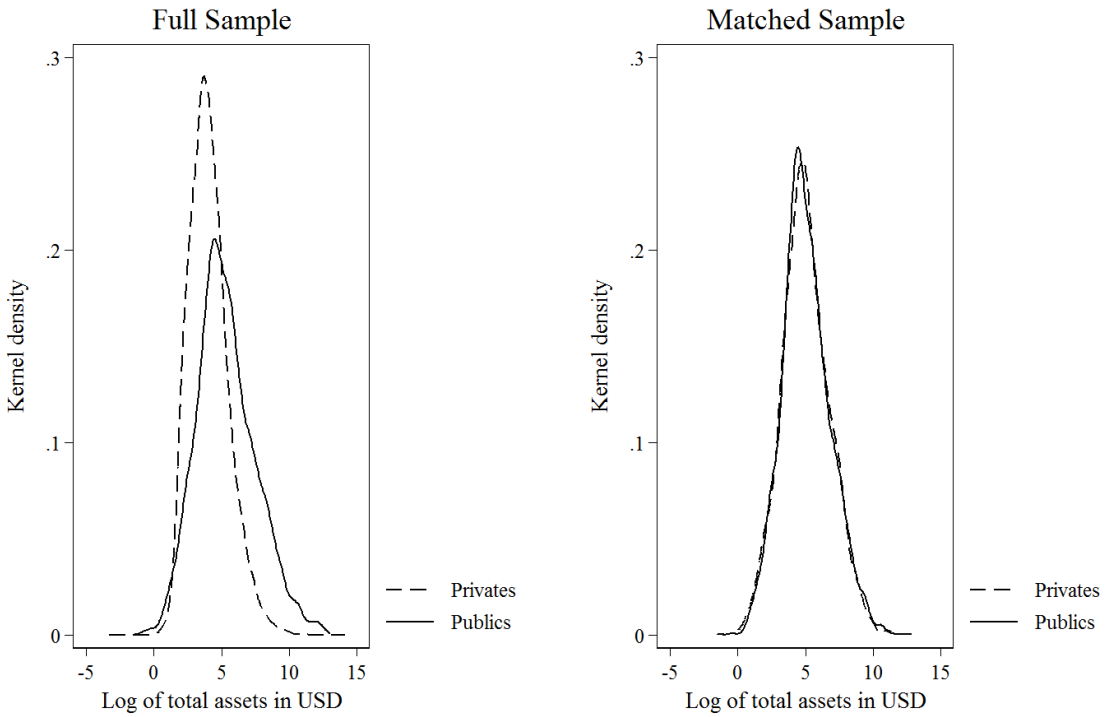
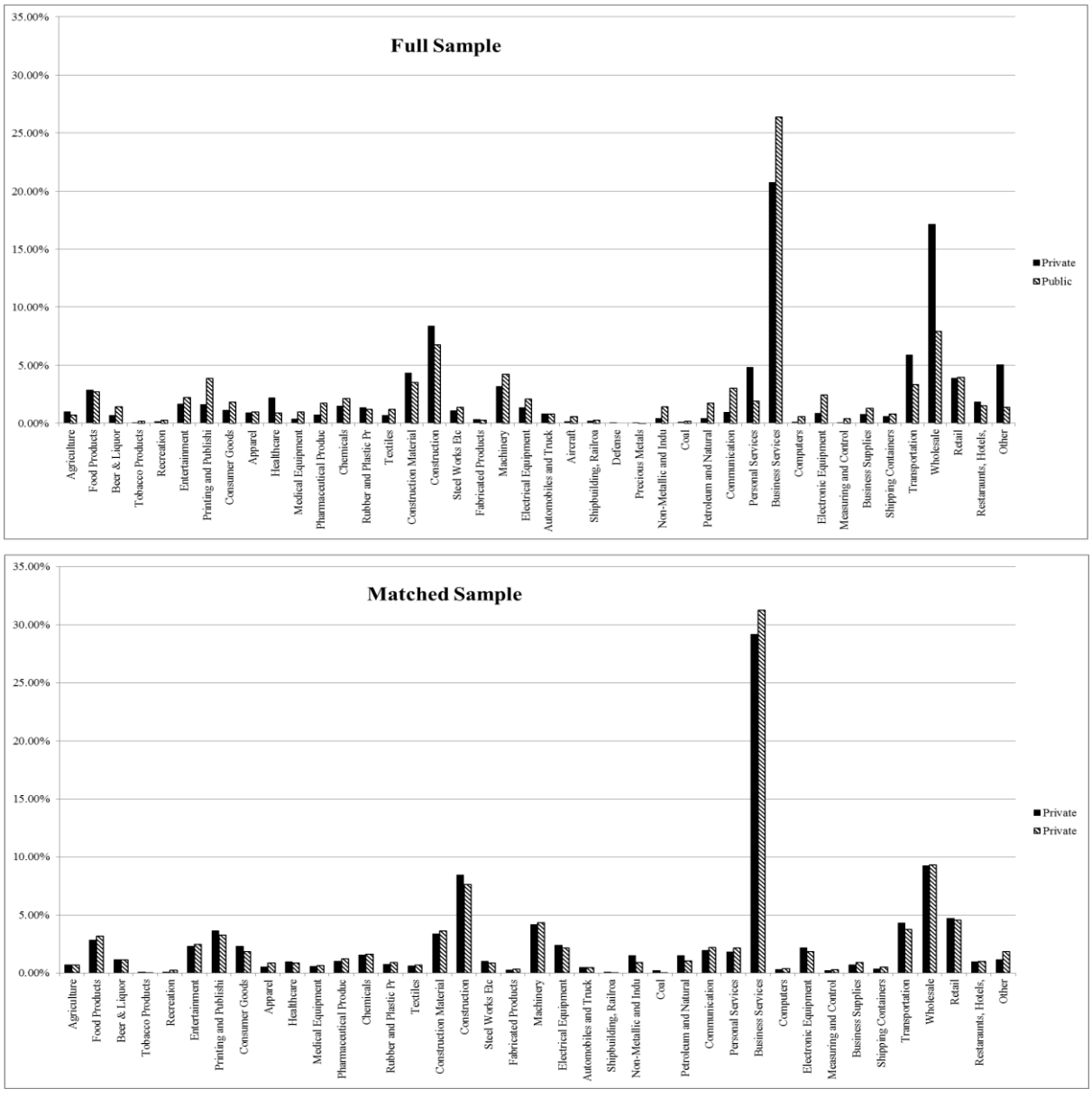


Figure II. *Industry distribution of the full and matched sample in firm-year observations.* The upper graph shows the industry distribution of the full combined sample of Amadeus firms. The bottom graph shows the industry distribution of the matched sample. Details on the matching algorithm are presented in the text. Industries are assigned using the Fama and French (1997) 48 industry classification on SIC codes. Frequencies represent the industries share of firm-year observations in the respective category (private or public companies).



Appendix

Table A.I
Variable definitions

This table provides information on how we construct the variables in the investment model together with Amadeus items.

Variable name	Abbreviation	Construction	Amadeus items
Net assets	na	Total assets *minus* current liabilities *plus* short-term debt	toas – culi + loan
Average net assets	ana	Average net assets of fiscal year	$(na_t + na_{t-1})/2$
Cash flow	CF	Net income *plus* depreciations	pl + depr
Sales growth	sgrowth	Annual percentage change in operating revenue	$(opre_t – opre_{t-1})/opre_{t-1}$
Debt	Debt	Short-term debt *plus* long-term liabilities	loan + ncli
Change in debt	dDebt	Annual change in debt	Δ(loan + ncli)
Cash holdings	Cash	Cash and cash equivalents	cash
Change in cash	dCash	Annual change in cash	Δcash
Profitability	Profit	Earnings before interest, taxes, depreciation and amortization (EBITDA)	ebta
Net working capital	NWC	Current assets *minus* cash *minus* current liabilities *plus* short-term debt	cuas – cash – (culi – loan)
Change in working capital	dNWC	Annual change in net working capital	Δ(cuas – cash – (culi – loan))
Fixed assets	fa	Total assets *minus* current assets	toas – cuas
Investment in fixed assets	Inv	Annual change in fixed assets *plus* depreciations	Δfa + depr
Equity Issues	Issues	Annual change in issued share capital	Δcapi
Shareholder Distributions	ShDis	Annual change in retained earnings *minus* net income	–Δosfd + pl

Figure A.I. *Industry distribution of the full and matched sample in total assets.* The upper graph shows the industry distribution of the full combined sample of Amadeus firms. The bottom graph shows the industry distribution of the matched sample. Details on the matching algorithm are presented in the text. Industry are assigned using the Fama and French (1997) 48 industry classification on SIC codes. Frequencies represent the industries share of total assets in the respective category (private or public companies