Do Nonfinancial Firms Hold Risky Financial Assets? Evidence from Germany[†]

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Abstract

Recent empirical evidence suggests that US industrial firms invest heavily in noncash, risky financial assets. Using hand-collected data on financial portfolios of German firms, we show that risky asset holdings are not an anomaly unique to the US. We find that industrial firms in Germany invest 11.6% of financial assets in noncash and risky assets. Value-weighted, this percentage increases to 25.4%. Although the equally-weighted average is substantial, it is clearly lower (5 percentage points) than that in the US. After accounting for cross-country compositional differences (especially the dominance of the US technology sector), this difference decreases but remains at 3 percentage points. The remaining difference is driven by institutional differences. In contrast to US firms, German firms largely follow precautionary savings motives and do not seem to misappropriate funds when shifting them toward riskier asset allocations. Our results have implications for how asset management by nonfinancial firms should be regulated.

JEL classification: G31, G32, G34, G38, G11

Keywords: Cash Policy, Financial Portfolio, Precautionary Savings, Liquidity Management

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1. Introduction

Over the past decades, corporate cash holdings have received considerable attention from academics and management practitioners. For many firm executives, managing corporate liquidity ranks among the most important tasks they face (e.g., Graham and Harvey, 2001). The key assumption in most studies on corporate cash holdings is that firms hold cash or risk-free, near-cash assets – which are often referred to as *CHE* [1]. In contrast, two recent studies for the US (Duchin et al., 2017; Darmouni and Mota, 2020) show that firms also invest in *noncash* and – to a large extent – in *risky* financial assets (such as mutual funds and equities). This broad range of securities in which nonfinancial firms invest results in financial portfolios [2] that are significantly larger than those identified by the traditional measure of corporate cash holdings, namely, *CHE* (Duchin et al., 2017). Thus, these findings challenge existing studies on corporate cash holdings in two ways. First, *CHE* underestimates the size of firms' actual financial portfolios. Second, risky financial asset holdings fail to protect firms from adverse cash flow shocks, as risky financial assets often decrease in value when firms need their precautionary savings most and other sources of funding are unavailable or excessively costly.

However, it is not clear if these findings are only confined to the US or if they generalize to other countries with different country-specific conditions. In fact, the US results are seriously affected by two US-specific phenomena. First, the special features of the US accounting and tax systems affect a firm's *financial portfolio size* and likely also affect its *financial portfolio composition*. In particular, previous studies show that the US repatriation tax leads to an accumulation of (foreign) cash holdings in the financial portfolios of firms (e.g., Foley et al., 2007; Faulkender, Hankins and Petersen, 2019). While most developed countries have territorial taxation *without* a repatriation tax, the US has had

[1] *CHE* is the Compustat abbreviation for the empirical standard measure of corporate cash holdings and consists of the sum of firms' balance sheet accounts labeled "cash and cash equivalents" and "short-term investments".

[2] We define a firm's *financial portfolio* as the sum of its cash holdings and any other nonoperating securities that are likely held for liquidity purposes. While most of the previous work on this topic focuses solely on firms' cash holdings, certain more recent studies also examine possible cash substitutes such as financial assets in general (e.g., Duchin et al., 2017; Darmouni and Mota, 2020), credit lines (e.g., Sufi, 2009; Acharya, Almeida, and Campello, 2013; Acharya et al., 2014) and the use of derivatives-based hedging (e.g., Froot, Scharfstein, and Stein, 1993; Campello et al., 2011).

a worldwide tax system *with* a repatriation tax.[3] Second, previous US studies are affected by the massive size of firms in the US technology industry (including firms such as Apple, Google, and Microsoft). Specifically, the financial portfolios of technology firms are among the largest (e.g., Darmouni and Mota, 2020) and riskiest (e.g., Duchin et al., 2017).[4] Thus, without analyzing financial portfolios outside the very specific US context (i.e., in the absence of the rather unique tax regulation and the large US technology firms), it is difficult to determine whether the previous results based on US data can be generalized to other countries.

In this paper, we begin filling this gap by empirically analyzing financial portfolios in the largest economy in Europe (Germany). Our study is the first on this subject outside the US and provides new evidence on both the *size* and the *composition* of firms' financial portfolios. To the extent that we find results similar to those found in the US, we underscore the relevance of these previous results in an independent sample of non-US firms. To the extent that we find differences, we provide complementary evidence on firms' financial asset holdings in addition to that of prior findings. Germany is a particularly good example to use for our analysis. It is not only the largest economy in Europe but also shares many country-specific conditions with other major continental European and East Asian countries, such as France, Italy, Spain, Portugal, and Japan, and these conditions differ from those in the US in material ways. In particular, these countries have a civil-law tradition (e.g., La Porta et al., 1998), a territorial tax system, a bank-based financial system (e.g., Campello et al., 2012), a comparably smaller equity market relative to GDP (e.g., Čihák et al., 2012) and a markedly less dominant high-tech sector (e.g., in Germany, manufacturing firms are responsible for a major part of the GDP). Our empirical analysis relies on a comprehensive, hand-collected data set that encompasses the financial portfolios of the largest nonfinancial firms in Germany.

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[3] At the end of 2011, 26 of the 34 OECD countries taxed only income generated within their national boarders, regardless of where the taxpayer was located (*territorial tax system*). Eight countries taxed domestic firms on all their income, regardless of where the income was generated (*worldwide tax system*). The United States is one of these eight countries and the only G-7 country that has a worldwide tax system. Following the passage of the Tax Cuts and Jobs Act, which became effective on January 1, 2018, the US tax system changed to a hybrid system with elements of both major tax systems.

[4] For example, the article "U.S. Government Has Less Cash Than Apple," which was published in *Forbes Online* on July 29, 2011, reported that Apple holds more cash and securities ($76.2 billion) than the US government ($73.8 billion).

In terms of *financial portfolio size*, we find that German firms invest an average of 16.2% of their book assets in (both safe and risky) financial assets. This percentage is only 3.7% larger than the empirical standard measure of corporate cash holdings, *CHE*. Thus, unlike the results found in the US, our results suggest that *CHE* is a reasonably good proxy for financial portfolio size (see also the detailed discussion in Section 4.1). These results have implications for the conclusions drawn from previous studies. For instance, Dittmar, Mahrt-Smith, and Servaes (2003) or Guney, Ozkan, and Ozkan (2007) find that US firms hold less cash than German firms. As *CHE* substantially underestimates the sizes of actual financial portfolios in the US but not in Germany, the observed cross-country differences in "corporate liquidity" documented by previous research could be caused by ignoring parts of the total financial portfolio in the US.

Figure 1: Risky Financial Assets: Germany and the US

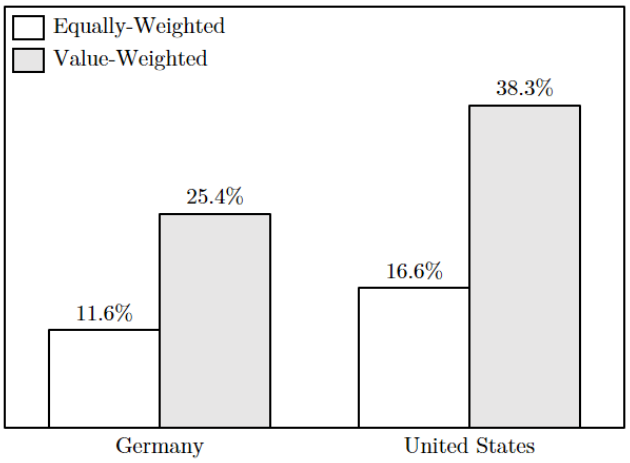

Figure 1. This figure compares the financial portfolio composition (i.e., the ratio of risky financial assets to total financial assets) of the average firm in Germany with that of the average firm in the US for the years 2009-2012. Data on US firms' financial portfolios are from Duchin et al. (2017). Value-weighted US data are year 2012 only.

Examining the *composition of financial portfolios*, we find considerable cross-country differences in the portion of the financial portfolio invested in *risky* assets (see *Figure 1*), even though the *total* financial portfolio sizes are similar in both countries. Equally-weighted, the average firm in Germany invests 11.6% of its financial portfolio in risky assets. While risky asset holdings in Germany are substantial, this percentage is considerably lower than that of US firms. The average German firm holds 5 percentage points (or 30% in relative terms) fewer risky assets in its financial portfolio than the average US firm, which invests 16.6% of its financial portfolio in risky assets (Duchin et al., 2017). Value-weighted, firms' risky financial asset holdings are substantially higher in both countries. In

Germany, the percentage increases to 25.4% of the average firm's financial assets. As the value-weighted statistics account for the importance of the results from the perspective of the overall economy, these findings may raise questions about required policy interventions regarding nonfinancial firms' asset management activities in Germany. Overall, our results suggest the existence of meaningful cross-country differences in firms' financial asset holdings.

To conduct a more thorough analysis of these on-average results, we empirically investigate the determinants of financial portfolio *size* and *composition* in Germany and compare our findings with those suggested by previous US studies. Beginning with the analysis of *financial portfolio size*, our cross-sectional results provide evidence that the traditional motives for holding cash – the transaction cost and the precautionary savings motives (e.g., Opler et al., 1999; Bates, Kahle, and Stulz, 2009) – are important determinants of the size of German firms' financial portfolios. However, in contrast to the studies on corporate liquidity for the US (e.g., Harford, Mansi, and Maxwell, 2008), we find no evidence that agency problems have explanatory power for the size of German firms' financial portfolios.

Regarding *financial portfolio composition*, our cross-sectional results show that firms mitigate the risks from adverse cash flow shocks not only by increasing the *size* of their financial portfolios but also by adjusting the *composition* of their financial investments – more specifically, by *decreasing* the risk exposure of their financial portfolios. Thus, in contrast to the inconclusive results obtained in the US (e.g., Duchin et al., 2017), our multivariate regressions suggest that the precautionary savings motive also affects financial portfolio composition, i.e., firms' relative allocation between safe and risky financial assets. In fact, we find a negative relationship between firms' risky financial asset holdings and different proxies for precautionary savings needs. To mitigate endogeneity concerns that could arise from a possible joint determination of the size and composition of firms' financial portfolio, we follow the literature (e.g., Duchin et al., 2017) and – in addition to our baseline estimates – provide estimates from a two-stage least squares (2SLS) model that exploits unexpected operating cash flow shocks (see Section 5.2.2). For cash flow volatility (the precautionary savings needs proxy that produces the most conservative results in terms of the standardized coefficients), an increase of one standard deviation leads to a decrease of 0.38 standard deviations (7.1 percentage points) in the stake of a firm's financial portfolio invested in risky asset classes. To corroborate these findings, we also

provide complementary evidence on the precautionary savings motive based on a shock-based difference-in-differences (DiD) design by exploiting the euro crisis as a source of exogenous variation of firms' precautionary savings needs.

In addition, and in contrast to the US, there is no evidence that agency problems can explain firms' higher risky portfolio investments. These results contradict the view that a breakdown of corporate governance may lead to high levels of risky financial asset holdings and dispel concerns about potentially value-reducing activities by firm management. We also find that, similar to the US, risky financial assets of German firms are concentrated in financially unconstrained firms with large financial portfolios.

Since German firms are on average smaller and operate in different industries than US firms, concerns may arise that our on-average findings are mainly driven by differences in firm characteristics. To address this concern, we use a methodology that is relatively new to the field of empirical corporate finance but is well-known in labor economics (e.g., from decomposing the gender pay gap) to study the mean outcome differences between firms in both countries – the Blinder-Oaxaca decomposition (Blinder, 1973; Oaxaca, 1973). In doing so, we use our regression results and decompose the cross-country differences in risky financial assets into an *explained* component (resulting from compositional differences in firm characteristics; the "covariate effect") and an *unexplained* component (resulting from effect size differences in regression point estimates; the "coefficient effect"). The unexplained component can be interpreted as a country-specific treatment effect (e.g., Fortin, Lemieux, and Firpo, 2011); that is, it can be viewed as a country-specific effect that explains the difference in risky financial asset holdings that remains after accounting for group differences in firm characteristics. Our findings reveal that after accounting for compositional differences (e.g., the massive size of firms in the US technology sector), German firms still place 3 percentage points (or 18% in relative terms) less of their investments in risky financial assets than US firms. This finding is consistent with the view that country effects unique to the US partially explain the differences in financial asset holdings between German and US firms. Subsequently, we discuss potential candidate explanations for the pronounced country effect documented by our results, such as tax regulation, national culture, and financial systems.

The paper is organized as follows. Section 2 provides a brief review of the related literature. Section 3 describes our sample construction and presents summary statistics. Section 4 shows the size and composition of the examined firms' financial portfolios. Section 5 presents our empirical predictions and examines the determinants of financial portfolio *size* and *composition* in terms of risk. Section 6 uses our previous results to decompose the cross-country differences in (risky) financial assets between German and US firms. Section 7 discusses policy implications and presents conclusions.

2. Related Literature

Our work is related and contributes to several strands of the corporate finance literature. A growing number of papers examine the size, properties and composition of industrial firms' "cash reserves and financial asset holdings" (e.g., Duchin et al., 2017; Darmouni and Mota, 2020; Chen and Duchin, 2021; Cardella, Fairhurst, and Klasa, 2021; Brown, 2014) by using samples of US firms. In contrast to the assumption made by traditional studies on "cash holdings", these papers show that US firms also invest in noncash and risky financial assets. These papers find that firms' actual financial portfolios are significantly larger than those identified by the traditional measure of corporate cash holdings, *CHE*. We complement these studies with the first analysis of the *size* and *composition* of firms' financial portfolios outside the specific US context. In doing so, we provide new evidence on the broader significance of the previous results, which are solely based on US data.

From a more general perspective, our findings have implications for the classical literature on corporate cash holdings, as financial assets can fund growth opportunities and mitigate adverse shocks just as well as actual cash. The predominant explanation for why firms hold cash is the precautionary savings motive. According to this view, firms hold cash to protect themselves against adverse cash flow shocks when other sources of funding are unavailable or excessively costly. For example, Kim, Mauer, and Sherman (1998), Opler et al. (1999), Faulkender and Wang (2006), Bates, Kahle, and Stulz (2009), Lins, Servaes, and Tufano (2010) and Duchin (2010) find empirical evidence suggesting that firms use cash holdings to reduce their financial distress costs in response to adverse cash flow shocks. Our results complement these findings by showing that firms in our sample (in contrast to US firms) mitigate the risks related to adverse cash flow shocks not only by *increasing* the *size* of their financial portfolios but also by adjusting the *composition* of their financial portfolios – more

specifically, by *decreasing* the risk exposure of their financial portfolios. Thus, German firms' financial policies related to risky financial asset holdings are consistent with the precautionary savings motive.

Finally, our work adds to the small literature that examines the cross-country variation in corporate cash holdings.[5] Most of the previous work in this area focuses on the impact of institutional conditions, such as laws and law enforcement, on firms' cash holdings. For example, Dittmar, Mahrt-Smith, and Servaes (2003) find evidence that firms in countries with weak shareholder protection rights have higher cash holdings because agency problems can occur more frequently. In line with Dittmar, Mahrt-Smith, and Servaes (2003), Pinkowitz, Stulz, and Williamson (2006) and Kalcheva and Lins (2007) show that cash holdings are valued more highly in countries with strong shareholder protection rights. While the previous work examining international data focuses only on firms' cash holdings, we analyze firms' *total* financial portfolio holdings.

3. Data Description and Sample Selection

3.1. Financial Asset Data

The empirical literature generally defines cash holdings as firms' "cash and short-term investments"[6], which are often referred to as *CHE*. *CHE* is a Compustat abbreviation and typically encompasses short-term financial assets with maturities of up to 90 days at issuance and/or securities that are intended to be liquidated within one year. Any other financial assets, such as corporate bonds or equities, are typically held in balance sheet accounts outside of *CHE*. In particular, these assets are held in the accounts "long-term investments" and "other assets". As these financial assets *outside* of *CHE* can fund growth opportunities or mitigate adverse shocks just as well as financial assets *inside* of it, *CHE* alone may considerably underestimate a firm's actual liquidity.[7]

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[5] The literature on corporate liquidity and cash holdings almost exclusively focuses on samples of US firms (see Almeida et al., 2014, for a discussion).

[6] More precisely, "cash and short-term investments" consists of the sum of the firms' balance sheet accounts "cash and cash equivalents" and "short-term investments".

[7] The balance sheet accounts "long-term investments" and "other assets" include financial assets with maturities of more than 90 days at issuance and/or securities intended to be liquidated after more than one year.

Because the size and composition of firms' *total* financial asset portfolios are not available in commercial databases, we hand-collect these data from the footnotes of the annual reports of all industrial firms included in the three largest German stock indices – the DAX (the 30 largest blue chip stocks), the MDAX (the 50 prime standard shares that rank below the DAX), and the TecDAX (the 30 largest prime standard shares of the technology sector) – for the years between 2009 and 2012.[8] For this purpose, we closely follow the data collection algorithm of Duchin et al. (2017) and Darmouni and Mota (2020). Based on this procedure, we collect data on firms' financial assets, which comprise both (1) the balance sheet accounts "cash and cash equivalents" and "short-term investments" and (2) any other *nonoperating* financial assets included in the balance sheet accounts "long-term investments" or "other assets" (see Appendix A1 for details on the data collection procedure). To focus on nonoperating financial assets, we exclude all financial asset positions that are earmarked for labor payments or operational purposes other than liquidity management (such as "pension assets", "derivatives", "receivables", and "strategic investments"). We refer to the total amount of a firm's financial assets as the firm's *financial portfolio* or the firm's *financial asset holdings*. Our data collection procedure exploits the disclosure requirements under IAS 39 and IFRS 7. These requirements mandate firms to disclose the fair values of their financial assets along with the procedures used. These requirements are similar to those stipulated by SFAS No. 157, which allows us to make direct comparisons of the results in this study with previous findings from the US without adjusting for differences in accounting.[9]

3.2. Sample Selection

In our study, we focus on the largest public firms in Germany. We create a sample comprising all firms listed in the DAX, MDAX, and TecDAX indices, which we refer to as HDAX firms. Following

[8] We carry out our analyses over the same sample period as in Duchin et al. (2017) to facilitate comparisons with their US results and to dissect between-country differences into compositional and structural parts (see Blinder-Oaxaca decomposition in Section 6). This sample period is also representative for firms' actual financial and risky asset investments in both countries. Total levels in (risky) financial assets for the year 2018 are very similar to those during the sample period 2009 to 2012 (for the US: see Darmouni and Mota, 2020, p. 31; for Germany: see footnote 13).

[9] The key requirements for the fair value disclosure of financial assets under IAS/IFRS and US-GAAP are identical (e.g., Hitz, 2007). For our sample period, the major difference is that US-GAAP specifies major asset classes for the disaggregation of financial assets, while IAS/IFRS does not. For a detailed comparison, see *Table IA1* of the Internet Appendix.

the literature, we exclude all financial institutions (SIC 6000-6999) and utilities (SIC 4900-4999), which leaves us with 70 industrial firms, corresponding to 269 firm-year observations with non-missing firm-level data necessary to compute the explanatory variables in our multivariate analyses. Finally, to reduce the effect of outliers on our results, we winsorize all variables at the 1st and 99th percentiles.

We report summary statistics in *Table 1*. To directly compare our results with previous findings from the US, *Table 1* also presents the results from the important study of Duchin et al. (2017), who examine the financial portfolios of S&P 500 firms for the same sample period. On average, German firms have financial portfolios that represent 16.2% of their book assets; this percentage is only 0.5 percentage points higher than that estimated with *CHE*, the traditional measure of cash used in the literature.[10] With a standard deviation of 12.6%, firms' financial portfolios also show a wide variation. The median firm holds 12.1% of its book assets in financial assets, which indicates that the distribution of financial portfolios is skewed to the right in the cross-section. *Table 1* also characterizes the different firm-level variables that we employ in this study. The table reveals a large amount of variation in the explanatory variables that the literature identifies as determinants of firms' financial portfolios (e.g., Opler et al., 1999; Bates, Kahle, and Stulz, 2009). For instance, the proxies for firms' distress costs, namely, R&D expenditures relative to book assets and the market-to-book ratio, have means of 2.5% and 1.6 and standard deviations of 3.8% and 0.8, respectively. In addition, *Table 1* enables cross-country comparisons by reporting tests of differences in means (t-tests) and medians (Fisher's exact tests). The table reveals that German and US firms differ across a wide range of firm-specific characteristics. On average, German firms are smaller, have lower market-to-book ratios and lower R&D expenses but have higher cash flow volatilities than their US counterparts. *Table A2* of the Appendix gives detailed definitions for the variables included in *Table 1*.

<< Insert Table 1 >>

[10] We examine this result in more detail in Section 4.

4. Size and Composition of Corporate Financial Portfolios

4.1. Size and Types of Financial Asset Holdings

This section offers a more detailed picture of corporate financial asset portfolios and the various types of financial assets held by firms. To focus our analysis, we group firms' financial assets based on their characteristics and risk profiles into the following broad asset classes: *cash and cash equivalents*, *deposits, commercial paper*, *money market funds*, *bond investments*, *equity investments*, *asset-backed securities*, and *other securities*. To allow for as much granularity as possible, we classify equity investments into *mutual funds* and *equities*. For bond investments, we further distinguish between *domestic government bonds*, *foreign government bonds* and *corporate bonds*. Whenever possible, we manually assign the hand-collected financial asset data to these asset classes. However, IAS 39 and IFRS 7 allow firms some flexibility in defining their reported asset classes. In particular, the standards allow firms to aggregate their assets into "classes of similar instruments" (IFRS 7.6). As a consequence, a few firms report distinct financial asset classes but also an aggregated position, which we label *aggregated accounts*.

Table 2 (Panel A) shows the sample-wide means of firms' financial portfolios by asset class relative to (1) total book assets, (2) the size of the total financial asset portfolio and (3) *CHE*. Again, the table also contains results from Duchin et al. (2017), who examine financial portfolios of S&P 500 firms. We analyze the size and detailed structure of German firms' financial portfolios and also compare our results to those found in the US.

<< Insert Table 2 >>

The size of firms' financial portfolios: Panel A of *Table 2* (column 1, last row) shows that firms' financial portfolios represent, on average, 16.2% of book assets. This number is only 1.3 percentage points lower than the 17.5% of book assets observed among industrial firms in the US.[11] Moreover, we find that German firms' financial portfolios are, on average, only 3.7% larger than the standard measure of cash holdings *CHE*, while financial portfolios of US firms are 16.9% larger (see columns 5

[11] In Section 6.1, we study these mean outcome differences (and those of subsequent statistics) using the Blinder-Oaxaca decomposition. For total financial portfolio size, we show that the mean group difference between both countries almost completely disappears if we account for the cross-country differences related to firm characteristics.

and 6 of Panel A). These findings suggest that *CHE* is a reasonably good proxy for the size of the financial portfolios of German firms (i.e., German firms hold only a few financial assets outside of *CHE*), while *CHE* markedly underestimates the financial portfolio size of US firms. The reason is that US firms hold a higher portion of their financial portfolios in assets typically classified as *long-term investments* (i.e., assets that firms intend to hold for more than one year), such as equities and asset-backed securities. *Figure 2* illustrates this finding by reorganizing the data in columns 5 and 6 of *Table 2*. The figure compares the financial asset composition (as a percentage of *CHE*) of US and German firms and breaks down non-cash financial assets by investment horizon (short- vs. long-term; brick 1) and risk (safe vs. risky; brick 2). Firms in the US hold a substantial amount of assets for the purpose of investing long-term (brick 1 in the right chart of *Figure 2*; 16.9% of the size of *CHE*). In Germany, the amount of these "long-term investments" is comparatively low (brick 1 in the left chart; only 3.7% of the size of *CHE*).

Figure 2: Breakdown of Firms' Financial Asset Holdings

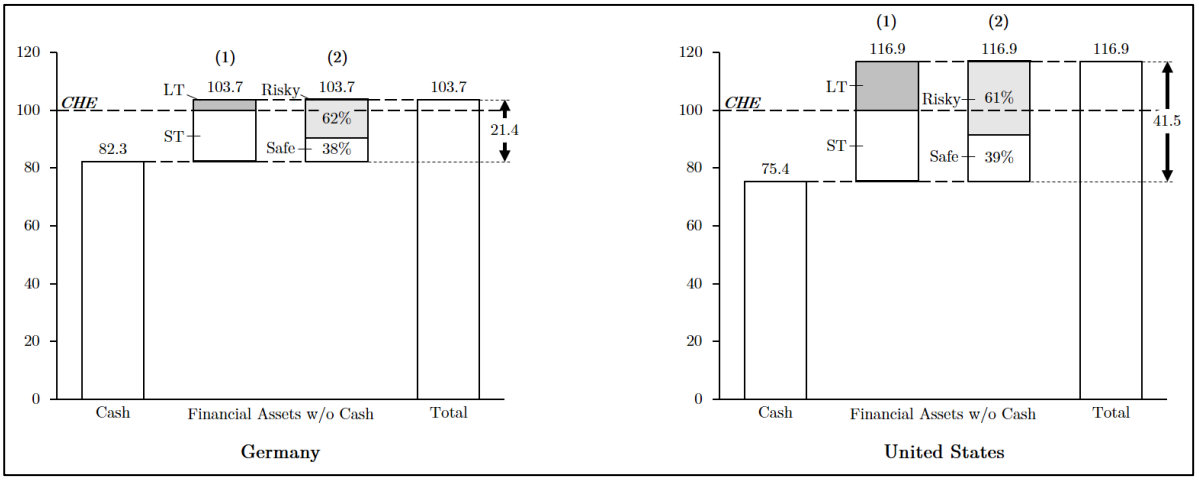

Figure 2. This figure compares the financial asset composition (as a percentage of *CHE*) of German and US firms. Brick 1 breaks down firms' financial assets (without cash) in short-term (ST) or long-term (LT) securities. Brick 2 shows a similar breakdown of firms' financial assets (without cash) but based on the safe-risky-classification scheme. Most firms' safe financial assets (without cash) are held in short-term investments. Data on US firms' financial portfolio composition are from Duchin et al. (2017).

The types of firms' financial asset holdings: Table 2 (Panel A) also shows that German firms, on average, invest the bulk of their portfolios in financial assets that represent cash or cash equivalents. In total, the asset classes cash and cash equivalents, deposits, commercial paper and money market funds constitute 88.1% of firms' financial portfolios (see column 3 of Panel A, rows 1-4). The remaining

portion of these portfolios consists of bonds (6.0%) and a few equities (0.2%). Investments in asset-backed securities are virtually nonexistent. These results are in stark contrast to those found in the US. US firms have substantially lower cash levels; they invest only 69.0% of their financial portfolio in cash or cash equivalents, which is 11.5% less than the amount that German firms invest. Instead, the average US firm invests two times more of its financial assets in bonds and eight times more of its financial assets in equities than the average German firm. US firms also invest a considerable amount in asset-backed securities (1.4% of financial assets). Taking a closer look at our data, Panel A of Table 2 reveals another difference between the financial portfolios of German and US firms. German firms invest 5.2% of their bond portfolio in domestic government bonds and 94.8% in higher-yielding corporate and foreign government bonds (unreported; based on column 3), whereas the composition of these two bond asset classes is relatively more balanced in the US. US firms invest 17.1% of their bond portfolio in domestic government bonds and 82.9% in higher-yielding bonds (unreported; based on column 4).[12]

4.2. Safe and Risky Financial Asset Holdings

Next, we examine the role of risk in firms' financial portfolios. In the US, industrial firms hold a considerable amount of their financial assets in risky asset classes; indeed, risky securities represent 16.6% of the average firm's financial portfolio (Duchin et al., 2017). These investment activities of US firms question the traditional boundaries between financial and nonfinancial firms and increasingly raise concerns about an essentially unregulated shadow hedge fund industry with minimal regulation and disclosure requirements.

Following the literature, we assess the riskiness of firms' financial assets based on the Federal Reserve's classification of securities (see Anderson and Kavajecz, 1994). We classify assets that the Federal Reserve labels "money-like" as *safe assets*. Safe assets comprise cash and cash equivalents, deposits,

[12] This finding could be related to the low interest rate environment in Germany during our sample period. Such a low interest rate environment might increase the appeal of investing in higher-yielding bonds to reduce the cost of carry to preserve corporate liquidity (e.g., Darmouni and Mota, 2020 provide evidence for a "reaching for yield" policy of firms when holding financial assets; see also Azar, Kagy, and Schmalz, 2016; Gao, Whited, and Zhang, 2021). Another possibility is that corporate and foreign government bonds are effective hedges for local cash flow shocks.

commercial paper, money market funds and domestic government bonds. We classify all remaining "non-money-like" assets as *risky assets*. These assets include *corporate* and *foreign government bonds*, *equities*, *asset-backed securities*, *aggregated accounts*, and *other securities*. Our approach is identical to the one introduced by Duchin et al. (2017), which facilitates the comparison of our results to those found in the US.

According to this asset classification scheme, we split the securities presented in Panel A of *Table 2* into "safe" and "risky" financial assets (the asset classes above/below the dotted line). *Table 2* (Panel B) reports the resulting risky/safe financial asset mix for the average firm and contains the corresponding results from Duchin et al. (2017) to allow for cross-country comparisons. The panel shows that the average German firm in our sample holds the vast majority (88.4%) of its financial assets in safe assets and 11.6% in risky financial assets. While the risky asset holdings of German firms are substantial, the fraction of risky assets of US firms is 16.6%, i.e., approximately 5 percentage points (or 43%) higher. Risky asset holdings of the average German firm are also smaller than those held by the average US firm when we relate them to total book assets (column 1) or *CHE* (column 3). German firms invest 2.3% of book assets (13.3% of *CHE*) in risky financial asset classes. This number is approximately twice as high in the US (4.8% of book assets; or 25.4% of *CHE*).[13]

The numbers in Panels A and B also reveal a commonality related to firms' *non*-cash financial assets between firms in both countries. Although there are clear differences in the *levels* of *non*-cash financial assets, the risky/safe financial asset mix within them is similar for firms in both countries. This asset mix is most easily seen by returning to *Figure 2* (bricks 2 in both charts). The figure shows that there is a relatively similar risky/safe financial asset mix within *non*-cash financial assets (Germany: 62% risky, 38% safe; US: 61% risky, 39% safe) in both countries. However, the figure also reveals marked differences in the overall levels of *non*-cash financial assets relative to *CHE* (Germany: 41.5%; US: 21.2%).

[13] As discussed in footnote 8, we analyze the same sample period (2009-2012) as in Duchin et al. (2017) to facilitate comparisons with their US results. In *Table IA2* of the Internet Appendix, using an additional hand-collected data set for the year 2018, we show that the main results of this section are qualitatively and statistically similar.

While we provide equally-weighted analyses throughout this paper, we also report analogous *value-weighted* statistics of the size and composition of German firms' financial portfolios in *Table A3* of the Appendix. These numbers allow us to assess the role of risk in nonfinancial firms' financial portfolios from the perspective of the whole economy, which is indicative of the importance of firms' risky asset management activities in the aggregate. Specifically, *Table A3* reveals that our qualitative conclusions in terms of risk remain unchanged if we consider value-weighted statistics. Compared to firms in the US, German firms still hold a substantial but smaller percentage of their financial portfolio in risky assets. However, the value-weighted average level of risky financial assets of firms in both countries is even about 120-130% higher than that of the respective equally-weighted average firm level. German (US) firms hold a value-weighted average of 25.4% (38.3%) of their financial portfolio in risky asset classes. This finding further supports our previous finding that risky assets represent an economically large portion of German firms' financial portfolios.

Overall, our results indicate that, on average, the total financial portfolios of firms in Germany and the US are quite similar in terms of size (as measured by the ratio of financial assets to book assets) but differ in terms of their composition with respect to risk. German firms hold an economically substantial but smaller fraction of their financial portfolios in risky asset classes than US firms.

4.3. Concentration of Risky Financial Asset Holdings and Industry-Level Effects

In this section, we examine the distribution of risky financial assets across firms and industries in more detail. We form portfolios by sorting firms into quintiles based on their risky financial asset holdings using the two measures introduced above: (i) risky financial assets/financial assets, i.e., the share of risky assets in a firm's total financial asset portfolio, and (ii) risky financial assets/book assets. Then, we report the within-quintile mean of risky financial assets (computed for the respective measure that constructs the quintiles).

<< Insert Table 3 >>

For the years 2009-2012, Panel A of *Table 3* reveals a substantial concentration of risky financial assets (to financial asset) holdings. The bulk of risky financial assets are concentrated in the top quintile of German firms. In the top quintile, risky financial assets, on average, account for 44.5% of firms' financial portfolios. In stark contrast, firms in the bottom quintiles hold almost no risky assets

in their portfolios: firms in the lowest quintile do not invest in risky financial assets at all; and firms in quintiles two and three hold only a negligible 0.2% and 2.7%, respectively, of their financial assets in risky asset classes. Of course, since the quintiles are formed by sorting firms according to their risky financial asset holdings, it is not surprising that the quintile means in Panel A increase monotonically. Nevertheless, the relatively small increase from quintiles one to three indicates that the distribution of firms' risky financial asset holdings is skewed to the right in the German cross-section. Overall, these results reveal that the (equally-weighted) on-average evidence (that firms invest 11.6% of their financial portfolio in risky assets) is largely driven by the top quintile of firms. Excluding the top quintile would substantially reduce the mean risky financial asset holdings of the equally-weighted average firm from 11.6% to 3.5%.

Next, we turn to a deeper analysis of firms in the top quintile shown in Panel A. Column 6 shows data for the 10 largest holders of risky assets. To allow for cross-country comparisons, we also show the data for the top 10 US firms in column 7.[14] Panel A shows that the average share of risky assets held by the top 10 German firms is 54.2% for 2012. In contrast, the *average* share of risky assets held by the top 10 US firms is massive, namely, 91.8%, i.e., approximately 70% larger than that of German firms. Not even one German company invests more in risky financial assets than any of the top 10 US companies (unreported): the German top 10 firm with the *largest* share of risky assets, K+S, holds approximately 72.7% of its total financial portfolio in risky assets, which is substantially smaller than the 85.9% held by Qualcomm (the US top 10 firm with the *smallest* share of risky assets).

For completeness, Panel B provides similar analyses of the share of risky financial assets relative to book assets. This ratio is indicative of how important a firm's risky financial asset holdings are in terms of its total economic resources. The results with the alternative ratio are qualitatively similar.

Finally, we investigate the composition of risky financial asset holdings at the industry level using the Fama and French (1997) five-industry classification scheme. *Table 4* breaks down German and US firms' risky financial asset holdings by industry. Duchin et al. (2017) find that technology and healthcare firms hold substantially more (in fact, more than twice as many) risky financial assets than

[14] Firm-level data for the top 10 holders of risky assets in the US are only available for the year 2012 (see Duchin et al., 2017, p.840).

firms in all the other sectors. For instance, US technology firms invest, on average, 26.9% of their financial assets in risky asset classes; healthcare firms invest 26.4%. US firms in all the other industries have considerably smaller risky financial asset holdings comprising 10.1% to 12.3% of their financial assets. Similarly, we identify differences in the average risky financial asset holdings across industries in Germany. These industry differences are pronounced but follow a different pattern than those in the US. The firms with the highest risky financial asset holdings (relative to total financial assets) are from the "consumer goods" industry (18.1%) and firms classified as "other" (28.4%). In contrast, firms operating in the "technology", "manufacturing", and "healthcare" sectors hold substantially lower levels of risky assets, namely, 5.4%, 11.1%, and 12.1%, respectively, of their financial portfolio. We explore "industry effects" in more detail in our multivariate analysis and the Blinder-Oaxaca decomposition (see Table 8 in Section 6). Of course, the differences in industry means are partially driven by firm-specific determinants of risky financial assets that systematically vary across industries (and that the univariate analysis presented here ignores by design). As we show in subsequent analyses, the differences between some industries (e.g., the pronounced gap of 23 percentage points between "other" and "technology") decrease substantially after accounting for firm-specific determinants of risky financial assets (see Section 6.1, Table 8, column 1).

<< Insert Table 4 >>

5. Determinants of the Size and Composition of Financial Portfolios

5.1. Empirical Predictions

Thus far, our findings suggest that marked cross-country differences in the financial portfolios of firms exist (see Section 4). To allow for a more thorough analysis of these cross-country differences, we analyze the factors that explain the cross-sectional variation in both the size of financial asset holdings and their composition (i.e., the split between safe and risky assets) and contrast these results with those from the US. This analysis is crucial given the scarce evidence about whether the US-centric view of corporate liquidity management generalizes to other countries as well (see Almeida et al., 2014, for a discussion). We also use the cross-sectional results to decompose and further analyze the causes of the mean outcome differences between Germany and the US in subsequent sections.

Financial portfolio size: Given that financial asset holdings provide corporate liquidity, the previous literature treats corporate financial assets as if they are perfect substitutes for cash. This behavior suggests that the factors that motivate firms to hold cash may also determine firms' financial asset holdings (Duchin et al., 2017). The economics and finance literature argues that firms balance the costs and benefits of holding cash. The costs commonly associated with cash holdings are lower returns due to a liquidity premium (e.g., Kim, Mauer, and Sherman, 1998) and possible tax disadvantages compared to shareholders holding cash directly (e.g., Miller, 1986; Masulis and Trueman, 1988). Firms gain two main benefits by holding cash. First, they avoid the transaction costs related to raising funds or liquidating assets that are incurred when firms do not hold enough cash to make their payments (e.g., Baumol, 1952; Miller and Orr, 1966). Second, they can use cash to finance projects when other sources of funding are unavailable or unreasonably costly (e.g., Kim, Mauer, and Sherman, 1998; Almeida et al., 2014). The literature refers to the first benefit as the *transaction cost motive* and the second benefit, originally suggested by Keynes (1936), as the *precautionary savings motive*. This leads to our first two hypotheses about financial portfolio size:

H1: Financial portfolio size increases with firms' transaction costs.

H2: Financial portfolio size increases with firms' precautionary savings demand.

However, managers and shareholders differ in terms of their perceptions about the costs and benefits of holding cash (e.g., Opler et al., 1999). Firms' management may want to hold excess cash to pursue their own objectives at the expense of their shareholders (e.g., Easterbrook, 1984; Jensen, 1986). Therefore, we expect that firms in which agency problems between managers and shareholders are more severe (i.e., those with weak corporate governance) hold more financial assets (the *agency motive*).

H3: Financial portfolio size increases with agency problems/weaker governance.

Financial portfolio composition: We also analyze the factors that affect the composition of financial asset holdings (i.e., the split between safe and risky assets). In line with Duchin et al.'s (2017) model of financial asset investments, we expect that financially unconstrained/cash-rich firms can hold more risky assets. Unconstrained/cash-rich firms face a lower expected cost of financial distress (including underinvestment), which allows them to shift more financial assets toward riskier asset allocations.

H4: Risky financial asset holdings increase with firms' financial portfolio size.

Second, we expect that firms with high precautionary savings demand hold fewer risky assets. Since risky financial assets often decrease in value when firms need their precautionary savings most and external financing is costly, investments in risky financial assets are less suitable for mitigating adverse cash flow shocks. Thus, our fifth hypothesis is as follows:

H5: Risky financial asset holdings decrease with firms' precautionary savings demand.

Third, managers might gain private benefits from investing in risky assets. Managers may engage in risky investments to enhance their work with more exciting tasks or evolve their human capital for jobs elsewhere (e.g., Holmström, 1999). We expect this behavior to be more prevalent in firms with agency problems (i.e., those with weak corporate governance); therefore, we expect that these firms invest more in risky financial assets.

H6: Risky financial asset holdings increase with agency problems / weaker governance.

Finally, a CEO's compensation contract might also affect the composition of firms' financial portfolios in terms of risk. Option-based compensation can increase CEOs' risk-taking incentives because they introduce convexities, making a CEO's expected compensation an increasing function of firm performance volatility (e.g., Smith and Stulz, 1985; Hall and Murphy, 2003). Thus, our seventh hypothesis is as follows:

H7: Risky financial asset holdings increase with CEOs' option-based compensation.

Before we empirically test our hypotheses, we define proxies for the transaction cost, precautionary savings and agency motives. Following the literature (e.g., Barclay and Smith, 1996), we use firm size as a proxy for firms' transaction costs. In addition, we use cash flow volatility, R&D expenditures and the market-to-book ratio as measures of firms' precautionary savings needs (e.g., Opler et al., 1999; Bates, Kahle, and Stulz, 2009). Finally, we follow the literature and employ common measures to proxy for the severity of agency problems between management and shareholders, using two measures of corporate governance quality: institutional ownership and family firm status (e.g., Anderson and Reeb, 2003; Dittmar and Mahrt-Smith, 2007; Andres, 2008). For detailed variable definitions, see *Table A2* of the Appendix.

5.2. Empirical Evidence

We examine the determinants of the size of the firms' financial portfolios (*H1-H3*) using the standard ordinary least squares (OLS) cash model described in Bates, Kahle, and Stulz (2009). Afterward, we continue by investigating the determinants of financial portfolio composition (*H4-H7*) using a two-stage least squares (2SLS) model, as proposed in Duchin et al. (2017). The 2SLS model mitigates potential endogeneity concerns that may arise because the size and the composition of firms' financial portfolios are jointly determined.

5.2.1. Financial Portfolio Size

We begin this section by presenting results from an ordinary least squares (OLS) estimation of the standard cash model to test hypotheses *H1-H3*. In particular, we estimate the following equation:

$$FA_{i,t} = \alpha_0 + \beta' X_{i,t} + \sum_t year_t + \sum_j ind_j + \varepsilon_{i,t} \quad (1)$$

The dependent variable, $FA_{i,t}$, is total financial assets in relation to book assets. $X_{i,t}$ refers to a set of observable firm-specific determinants of financial portfolio size, including the proxies for the transaction costs, precautionary savings, and agency motives, as well as some controls that were identified by the previous literature (e.g., Opler, 1999; Bates, Kahle, and Stulz, 2009). We control for industry and year fixed effects to absorb time-invariant differences across industries (see Section 4.3) and time-varying shocks that affect all firms. Moreover, we cluster standard errors at the firm level to adjust for heteroscedasticity and possible dependence in the residuals over time (Petersen, 2009). *Table 5* reports the estimates of equation (1). In Panel A, the baseline specification, we examine the transaction costs and precautionary savings arguments (*H1* and *H2*). In Panel B, the agency specification, we re-estimate these regressions with different proxies for corporate governance (*H3*).[15]

[15] For robustness, we repeat this (and subsequent) analyses in alternative specifications without industry fixed effects to exploit the full cross-sectional variation in our dataset. These alternative specifications account for the possible concern that insufficient within-industry variation could affect our results. For instance, low within-industry variation in the covariates may lead to possible measurement error problems in our data and cause attenuation bias. The results are qualitatively similar (see *Tables IA3* and *IA4* of the Internet Appendix).

Table 5 (Panel A) indicates that a strong negative relationship exists between firm size and financial portfolio size, which is consistent with the transaction cost motive. Across all specifications, the estimated coefficient of firm size is uniformly negative, economically large and statistically significant. In the univariate specification (column 1), the coefficient of firm size equals 3.1% and is statistically significant at the 1% level. The size of the estimated coefficient is similar across the alternative specifications in Panel A, e.g., when we add the controls (column 2: 2.2%) or the proxies for the precautionary savings motive (column 5: 1.6%). In our baseline specification including all controls, which is shown in column 5, a one-unit-point (one standard deviation) increase in firm size is associated with a 1.6 percentage point (0.25 standard deviation) decrease in financial asset holdings, which is a $441 ($855) million decrease for the average firm in our sample.

Moreover, *Table 5* reveals that a positive relationship exists between the size of firms' financial portfolios and the proxies for their precautionary saving needs. This association is uniformly positive, statistically significant at the 1% (5%) level, and economically relevant across all specifications.[16] For example, in column 3, the coefficient of the market-to-book ratio (the precautionary savings proxy that produces the most conservative results in terms of standardized coefficients) equals 3.4% and is statistically significant at the 5% level. When we add controls and firm size as a proxy for the transaction cost motive (column 5), a one-unit-point (one standard deviation) increase in the market-to-book ratio is associated with a 4.7 percentage point (0.28 standard deviation) increase in financial portfolio size, which is a $1,297 ($982) million increase for the average firm in our sample. The signs of the remaining controls are consistent with the results of the extant literature on corporate cash holdings (e.g., Opler et al., 1999; Almeida, Campello, and Weisbach, 2004; Bates, Kahle, and Stulz, 2009).

<< Insert Table 5 >>

In Panel B, we present the specifications that include the different proxies for corporate governance (i.e., institutional ownership and family firm status) to study the relevance of the agency motive. As shown in columns 6-9, we find an insignificant relation between governance and financial portfolio

[16] In (unreported) univariate regressions, the association between financial asset holdings and the three precautionary savings proxies is similarly economically and statistically significant.

size. Neither the coefficients on institutional block holdings nor those on family firm status are significant across the different specifications – with and without additional covariates.

Taken together, our results suggest that the precautionary savings and the transaction cost motives are statistically significant and economically relevant determinants of financial portfolio size. In contrast, we find no evidence that agency motives drive the size of firms' financial asset holdings. Our results are largely consistent with previous findings from the US.

5.2.2. Financial Portfolio Composition

After analyzing the determinants of financial portfolio *size*, we continue by examining the hypotheses regarding financial portfolio *composition* (*H4*-*H7*). Our regression equation is:

$$Risky\_FA_{i,t} = \alpha_0 + \alpha_1 FP\_Size^*_{i,t} + \beta' X_{i,t} + \sum_t year_t + \sum_j ind_j + \varepsilon_{i,t}, \qquad (2)$$

where $Risky\_FA_{i,t}$ is the ratio of firms' risky assets to their total financial assets, $FP\_Size^*_{i,t}$ is the predicted value of firms' financial portfolio size based on the first-stage of a 2SLS model (introduced below), and $X_{i,t}$ refers to firm-specific determinants of financial portfolio composition.

Equation (2) is similar to equation (1) but has two major differences. First, we use firms' risky financial asset holdings as the dependent variable. Second, we include financial portfolio size ($FP\_Size^*_{i,t}$) as an additional explanatory variable (see *H4*). Since these modifications result in a regression equation that contains the (endogenous) size of the financial portfolio (see Section 5.2.1), we use the 2SLS regression model following Duchin et al. (2017). This model aims to mitigate possible endogeneity concerns related to the joint determination of financial portfolio *size* and its *composition*. We exploit unexpected cash flow shocks as an instrument for *actual* portfolio size (see Duchin et al., 2017). The identifying assumption is that (arguably random) unexpected cash flow shocks affect the size of the firm's financial asset portfolio (relevance condition) but predict the dependent variable only through the instrumented variable, portfolio size (exclusion condition).[17]

[17] We explain the empirical model in detail in Internet Appendix IA5.

Table 6 reports the OLS and 2SLS second-stage regression estimates of the empirical model. In Panel A, we show the results of our baseline specification (*H4* and *H5*). In Panel B, the agency specification, we re-estimate this regression but also include the different proxies for corporate governance (*H6*). Finally, in Panel C, we present the results from a third model, the CEO specification, which additionally analyzes managerial risk-taking incentives (*H7*) and standard CEO characteristics, such as age, tenure, and gender, on a slightly smaller sample.[18]

Column 2 reports the first-stage regression estimates of our baseline specification. The coefficient of the instrument (i.e., unexpected cash flow) is both economically and statistically significant and passes the test for weak instruments (see, for example, Stock, Wright, and Yogo, 2002) with an F-value of 12.1. This result supports the instrument relevance condition. For brevity, we omit the first stage results of the other specifications, which are qualitatively and statistically similar.

Column 3 shows the second-stage estimation results. The results reveal that there is a strong positive relationship between firms' risky financial asset holdings and the size of their financial portfolios (*H4*). The association is significantly different from zero at the 5% level; additionally, the estimated coefficient is of sizable economic magnitude. A one-percentage point increase in portfolio size is associated with an economically substantial increase of 2.2 percentage points in risky assets. The size of the estimated coefficient is similar across the alternative second-stage 2SLS specifications (columns 4-6). In column 3, we also find a strong relationship between firm size and risky asset holdings. This effect is statistically significant at the 1% level and implies a 9.9 percentage point (0.53 standard deviation) increase in risky assets for a standard deviation increase in firm size, with similar coefficients in the alternative specifications (columns 4-6). Consistent with *H5*, we find a statistically significant negative, although weaker, relationship between firms' risky financial assets and the proxies for precautionary savings needs (cash flow volatility, R&D expenditures, and market-to-book ratios).[19]

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[18] Due to data availability, our sample size reduces by approximately 20% when we include the measure of risk-taking, option-based compensation. The German Executive Compensation Disclosure Act (2005) requires publicly listed firms to disclose the compensation of their management boards in their annual reports. However, the act also allows firms to opt out of these requirements by a confirmation decision of the annual general meeting.

[19] In the following, we provide complementary evidence on the precautionary savings motive based on a shock-based difference-in-differences (DiD) design.

<< Insert Table 6 >>

In Panel B, we show the results from similar regression specifications that, in addition, include the different proxies for corporate governance (i.e., institutional ownership and family firm status). Similar to our results for firms' financial asset size, we find *no evidence* that the agency motive can explain firms' financial portfolio composition. The coefficients of the governance proxies are statistically insignificant and close to zero.

Finally, in Panel C, we present the results from our CEO specification that includes the proxy for managerial risk-taking incentives (the CEOs' annual option-based compensation as a percentage of total compensation)[20] and standard CEO characteristics such as age, tenure, and gender. As shown in column 6, we find an insignificant relationship between managerial risk-taking incentives and risky financial asset holdings. The estimated coefficient is neither economically nor statistically significant. Additionally, none of the CEO characteristics (i.e., age, tenure, and gender; unreported) has a significant impact on the composition of firms' financial portfolios in Germany.

Overall, our results suggest that financially unconstrained firms with large financial portfolios as well as firms with low precautionary savings needs hold relatively more financial assets in risky asset classes. On the other hand, we find no evidence that managerial risk-taking incentives and agency motives drive the composition of firms' financial portfolios with respect to risk. Our results are largely in contrast to previous findings from the US. Duchin et al. (2017) suggest that managerial risk-taking incentives and the agency motive affect firms' financial portfolio composition. In addition, their empirical evidence on the precautionary savings motive (to hold *less* risky assets) is inconclusive.

Difference-in-Differences Strategy: Additional Evidence on the Precautionary Savings Motive. To corroborate our 2SLS findings, we provide complementary evidence on the precautionary savings motive of holding (less) risky financial assets (*H5*) based on a shock-based empirical design.

[20] To calculate this measure, we hand-collect data for CEOs of TecDAX firms and use the executive compensation database from Beck, Friedl, and Schäfer (2020) for CEOs of DAX and MDAX firms. Earlier studies typically use vega (the sensitivity of a CEO's option holdings or total wealth to a change in stock price volatility) as a measure of CEO risk-taking incentives (e.g., Rajgopal and Shevlin, 2002; Coles, Daniel, and Naveen, 2006), which we cannot construct given the limited data availability for German CEOs.

Specifically, we exploit the euro crisis of 2010-2012, which affected some firms more than others, as a source of exogenous variation on firms' precautionary savings needs in a difference-in-differences (DiD) framework. More precisely, as a sovereign debt crisis, the euro crisis resulted in tighter bank lending (see, for example, Acharya, Drechsler, and Schnabl, 2014; Acharya et al., 2018), which we exploit as an exogenous shock on firms' (refinancing) risk and ultimately, their precautionary savings demand. If precautionary savings needs are a major motive for holding less risky financial assets, then firms that are more affected by the euro crisis should adjust the composition of their financial portfolio towards less risky financial assets to smooth the shock.[21] To formally test this conjecture, we employ a difference-in-differences (DiD) design that uses firms with a high euro crisis exposure (which are defined as firms with an above median ratio of long-term debt expiring during the euro crisis period of 2010-2012, scaled by total book assets in the pre-crisis period 2009) as the treatment group (labeled as "high-exposure firms"). The remaining sample firms ("low-exposure firms") enter the control group.[22] Moreover, we define a post-shock indicator that equals one for the years from 2010-2012 (the euro crisis period), and zero for the pre-crisis period of 2009.[23] Then, we run the following DiD specification:

$$\begin{aligned} Risky\_FA_{\mathrm{i,t}} = \alpha + \delta_{DiD} \times High\text{-}Exposure_i \times Post\text{-}Shock_t + \delta_{High\text{-}Exposure} \times \\ High\text{-}Exposure_i + \delta_{Post\text{-}Shock} \times Post\text{-}Shock_t + \beta' X_{i,t} + \epsilon_{i,t}, \end{aligned} \tag{3}$$

The dependent variable, $Risky\_FA_{i,t}$, is the ratio of firms' risky financial assets to their total financial assets. $High\text{-}Exposure_i$ is the previously defined indicator that equals one for all treated firms and zero otherwise; $Post\text{-}Shock_t$ is the indicator for the post-shock period, $X_{i,t}$ refers to the set of covariates from our baseline OLS specification including financial portfolio size (see *Table 6*), and $\epsilon_{i,t}$ is the unobservable error term. The coefficient of interest is δ_{DiD}, which measures the average change in risky financial asset holdings in the treatment group compared to the change in the control group

[21] We thank an anonymous referee for suggesting this analysis.

[22] As is common for shock-based empirical identification strategies, the euro crisis affected *all firms* in the economy, so there is no "true" control group in our sample. However, the crisis affected some firms more than others. By dividing our sample into high-sensitivity and low-sensitivity (to the shock) subsamples, our empirical design is a common variant of the traditional DiD, using the low-sensitivity subsample as a control group.

[23] For the detailed variable definitions, see *Table A2* of the Appendix.

before and after the shock. A statistically significant and negative coefficient would provide further support for the precautionary savings motive of risky financial asset holdings.

<< Insert Table 7 >>

Column 1 of *Table 7* presents the estimation results. The coefficient of interest, δ_{DiD}, equals -5.9% and is statistically significant at the 10% level. This result suggests that high euro crisis exposure firms reduce their risky financial assets substantially after the shock compared to low exposure firms. Similar to the baseline specification, our model includes financial portfolio size as a covariate. Therefore, the relative decrease in risky financial asset holdings for high-exposure firms is a result of a compositional change and is not driven by a mechanical change in financial portfolio size. Put differently, the DiD results suggest that high exposure firms convert risky financial assets into safe assets during the euro crisis, which is consistent with the precautionary savings hypothesis for holding (less) risky financial assets. In column 2 of *Table 7*, we also show the estimates for an alternative specification that replaces the dependent variable with the ratio of risky financial assets to *total book assets*. The coefficient on the DiD-estimator (-1.9%) remains negative and statistically different from zero at the 10% level.

Taken together, the firm behavior during the euro crisis supports our previous evidence on the composition of firms' financial portfolios (see *Table 6*). In addition, the DiD results are in line with the view that German firms pursue a rather conservative financial policy, which might be attributed to the institutional environment in Germany; we discuss this in Section 6.2.

6. Decomposition of Differences in Financial Portfolio Composition

6.1. Blinder-Oaxaca Decomposition: Analysis

Our results thus far indicate that there are marked mean outcome differences in risky financial asset holdings between German and US firms (investing 11.6% and 16.6%, respectively, of their financial assets in risky asset classes). However, since German firms are, e.g., on average, smaller and operate in different industries than firms in the US (see the previous sections), concerns may arise that our on-average findings are mainly driven by differences in firm characteristics. For example, and as we showed in the multivariate regressions, as larger firms hold more risky assets in their financial

portfolios, the observed differences could be simply a consequence of US firms, e.g., being larger on average. To account for this concern, we use our regression results and estimate a Blinder-Oaxaca (Blinder, 1973; Oaxaca, 1973) decomposition to break down the cross-country differences in risky financial assets into an *explained* component (resulting from the compositional differences in firm characteristics; the "covariate effect") and an *unexplained* component (resulting from the effect size differences in regression point estimates, including differences in the intercept; the "coefficient effect").[24] The literature typically interprets this unexplained component as an effect similar to a treatment effect (e.g., Fortin, Lemieux, and Firpo, 2011) – in our case, a "treatment effect" of US-specific conditions on firms' financial portfolios.

Specifically, the Blinder-Oaxaca decomposition asks the counterfactual question of what the mean outcome difference in risky financial assets would be if the (empirical) relationship between firm characteristics and risky financial asset holdings of German firms stayed the same, but their average firm characteristics were identical to those in the US. The difference between the *observed mean* of the average firm in Germany and the *predicted mean* of the counterfactual firm (with mean US firm characteristics) is the *explained* component in the Blinder-Oaxaca decomposition. The remaining difference is the unexplained component, which results from country-specific structural differences that link observed firm characteristics to the outcome.[25] *Figure 3* shows the key finding of the decomposition and compares risky financial asset holdings of German firms to those of US firms. The figure reveals that compositional differences explain 2.0 percentage points of the 5.0 percentage-point gap in risky financial assets. However, after accounting for these compositional differences (i.e., the differences in the distribution of the covariates), German firms still invest 3 percentage points (or 18% in relative terms) less of their financial portfolio in risky assets than US firms. This finding suggests that structural differences explain the majority of the observed outcome differences in firms' risky financial asset holdings between both countries.

[24] This methodology is relatively new to empirical corporate finance, but it is already well-established in labor economics. The works of Füss, Gehrig, and Rindler (2016) and Mueller and Yannelis (2019) are among the first papers that apply this methodology to finance. Fortin, Lemieux, and Firpo (2011) provide a comprehensive survey discussing decomposition methods in economics.

[25] Appendix A4 contains more details about the Blinder-Oaxaca decomposition.

Figure 3: Blinder-Oaxaca Decomposition of Mean Outcome Differences

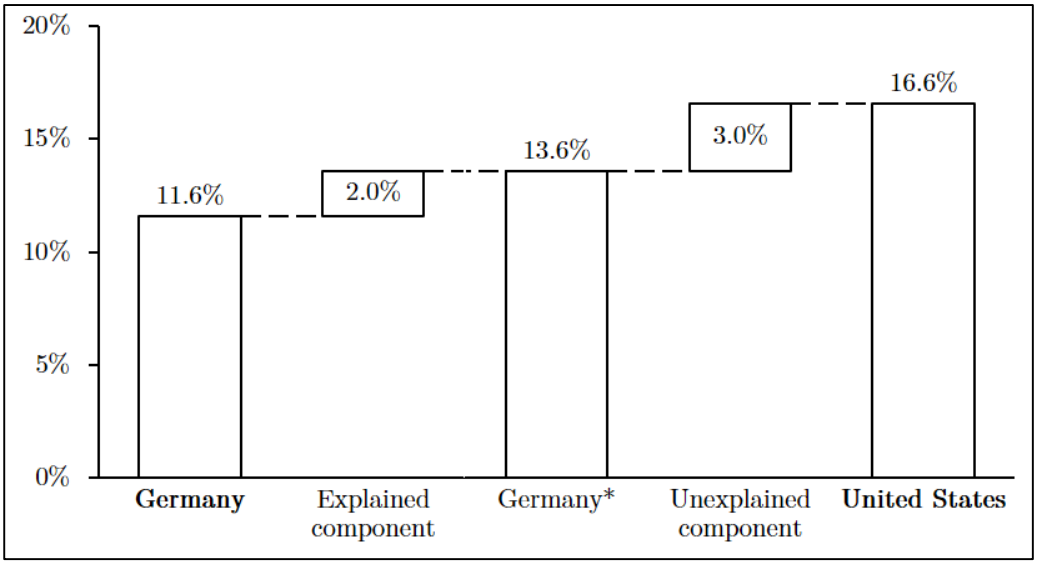

Figure 3. The figure compares the level of risky financial assets (i.e., the ratio of risky financial assets to total financial assets) of the average firm in Germany and the US using a Blinder-Oaxaca decomposition; that is, the figure decomposes the observed risky financial asset gap into an explained, compositional, component and an unexplained component driven by country-specific conditions. Germany* represents the predicted mean of a counterfactual firm (with mean US firm characteristics). Data on risky financial asset holdings of US firms are from Duchin et al. (2017).

Table 8 shows the results from the detailed Blinder-Oaxaca decomposition. With this analysis, we dissect the respective contributions of each covariate to the composition effect (the explained component).[26] In other words, the detailed decomposition separates the explained component (2.0 percentage points, see *Figure 3*) into portions attributable to the individual explanatory variables.

<< Insert Table 8 >>

We begin by examining the effect of *firm size* and *financial portfolio size.* These two covariates explain large parts of the risky financial assets gap (1.6 and 0.8 percentage points, respectively). For example, since large German firms hold relatively more risky financial assets (column 1, row 1) and US firms are on-average larger than firms in Germany (column 4, row 1), the ratio of risky financial assets in Germany increases by 1.6 percentage points (column 5, row 1) if we account for compositional differences with respect to firm size. Another covariate that contributes strongly to the risky financial

[26] We cannot present detailed decomposition results for the unexplained component because the raw data from Duchin et al. (2017) is unavailable.

asset gap is the indicator of being in the *consumer industry*. This industry indicator explains 1.9 percentage points of the 5.0 percentage point gap in risky financial assets (column 5, row 12). The reason is that the share of firms in this sector in the US is relatively large (26% of firms) compared to that in Germany (11%). At the same time, German consumer good firms hold 12.5% more in risky assets relative to the omitted category (the indicator for being in the *technology industry*), holding constant the other regressors.[27] However, there are also firm characteristics with a negative impact on the explained component. For example, the precautionary savings proxies "R&D expenditures" and "market-to-book ratio" have a strong negative effect on the explained component. The reason is that US firms on average have a higher precautionary savings demand (as measured by these two proxies) than German firms and that firms with a higher demand for precautionary savings hold relatively fewer risky assets in Germany. Taken together, the incremental contribution of covariates with a positive impact on the composition effect outweighs that of the covariates with a negative impact, resulting in the net total of a 2.0 percentage point explained component (as shown in *Figure 3*).

For completeness, we also perform the above analysis for *financial portfolio size* (see *Table IA6* of the Internet Appendix). As presented in Section 4, the financial portfolio size of the average German firm is only slightly lower than that of the average US firm (16.2% vs. 17.5% of book assets). The decomposition results indicate that this difference almost completely disappears if we account for compositional differences. Therefore, the difference in financial portfolio *size*, which results from country-specific effects, is negligible.

Overall, our results indicate that more than half of the observed difference in risky financial assets between German and US firms is attributable to the unexplained structural component of the Blinder-Oaxaca decomposition. Therefore, concerns that our results are only caused by compositional

[27] The coefficients of the industry indicators in column 1 of *Table 8* (consumer: 12.5%, healthcare: 10.5%, other: 10.4%, manufacturing: 3.1%; relative to the omitted group technology) also reveal that the *univariate* differences in industry means (see Section 4.3) are partially driven by firm-specific characteristics, such as firm size, for which we control for in the multivariate analysis. After accounting for firm characteristics, "industry effects" are more equally distributed compared to our univariate analysis. The remaining differences in risky asset holdings between industries in Germany (as well as the respective patterns in the US) likely reflect variation in industry-level factors, such as market concentrations, geographical footprints, industry life cycle stages, business models, or product dynamics.

differences in firm characteristics are unlikely to be valid. Instead, our results are consistent with the view that country-specific effects in large parts drive US results.

6.2. Discussion and Interpretation

To the extent that our model (taken from Duchin et al., 2017) exhaustively accounts for the determinants of risky financial asset holdings *within* countries, the "unexplained" part of the decomposition captures the effect of country-specific factors (i.e., factors that vary *between* but not *within* countries) on risky financial asset holdings. A formal analysis of these factors would require international, firm-level data on financial portfolios and sufficient cross-sectional (or even time-series) variation in country-specific characteristics.[28] With such data, country-specific factors (in particular, institutional structures) and their effects on the benefits and costs of holding risky financial assets could be captured either through (i) plain country fixed effects or, more directly, (ii) by adding institutional variables and (iii) interaction effects between these variables and firm- and industry-level factors.

In the following, we provide a discussion of country-specific factors that may explain the cross-country variation in firms' financial asset holdings. Exploring these candidate explanations may provide promising avenues for future research.

Tax Regulation. Cross-country variation in tax regulation (and tax costs) may help explain the observed differences between German and US firms' risky financial asset holdings in our study. While Germany (as the vast majority of developed countries) has a territorial tax system without a repatriation tax, the US has had a worldwide tax system with a repatriation tax. Prior research suggests that taxes associated with repatriations create incentives for large, multinational US firms to accumulate financial assets in low-tax jurisdictions (e.g., Foley et al., 2007; Faulkender, Hankins, and Petersen, 2019). In addition, using a rich panel data set of US firms, more recent work by Darmouni and Mota (2020, 2022) argues that repatriation tax burdens may also provide cross-border

[28] By design, comparing only two countries in a Blinder-Oaxaca decomposition cannot account for the potential impact that country-specific factors have on the results.

tax incentives for investments in (risky) marketable securities (e.g., corporate bonds and equities). These asset classes can yield more financial income than cash-like instruments and can therefore allow firms to reduce the cost of carry when delaying the repatriation of earnings abroad.[29] As a result, differences in tax regulation may explain why US firms, in contrast to firms in Germany, invest a larger share of their financial portfolio in risky asset classes.

Financial System. Another possible explanation for the residual differences in risky financial asset holdings (after accounting for firm-specific characteristics of German and US firms) relates to cross-country differences in financial systems. In bank-based financial systems such as Germany and other continental European countries, banks play a leading role in the allocation of resources in the corporate sector, and firms frequently form long-term relationships with a particular bank.[30] In bank-based financial systems, banks - in their role as debt issuers and strong monitors – tend to impose more risk-averse, debtholder-oriented *real* investment policies on firms (see, e.g., Nakatani, 1984; Weinstein and Yafeh, 1998) than banks in market-based financial systems, such as in the US and the UK, do. In light of these studies, the marked unexplained component in the Blinder-Oaxaca decomposition of 3.0 percentage points could suggest that bank influence on firms to pursue conservative investment policies could spill over from *real investments* to *financial investments* with respect to risky financial asset holdings.

National Culture. Another possible explanation for the (unexplained) mean outcome differences in risky financial asset holdings (as shown in the Blinder-Oaxaca decomposition) are the cultural differences between Germany and the US. A number of papers suggest that national culture affects risk-taking. For instance, using a large international sample of 35 countries, Li et al. (2013) show that earnings volatility and risky R&D investments (their measures of corporate risk-taking) are correlated with common dimensions of national culture, such as individualism and uncertainty avoidance. Similarly, Kanagaretnam, Lim, and Lobo (2014) find evidence that bank risk-taking is related to

[29] Darmouni and Mota (2020, 2022) do not classify financial assets into safe and risky assets, but their findings are largely driven by "non-money-like" asset classes (in particular, corporate bonds) that we classify as "risky".

[30] For a comprehensive discussion of the measurement and evolution of financial systems, see Allen and Gale (2000) and Demirgüç-Kunt and Levine (2001).

national culture. In particular, these studies find that corporate/bank risk-taking is higher in countries characterized by high levels of individualism and low levels of uncertainty avoidance.

In fact, there are marked differences between the US and Germany with respect to individualism and uncertainty avoidance. According to the seminal work of Hofstede (2001), the individualism score of the US (score: 91; rank: 1 of 53) is about one standard deviation higher than that of Germany (score: 67; rank: 15 of 53).[31] Similarly, the uncertainty avoidance score of the US (score: 46; rank: 43 of 53) is about one standard deviation lower than that of Germany (score: 65; rank: 29 of 53). Because individualism (uncertainty avoidance) is found to be positively (negatively) associated with corporate and bank risk-taking (as documented by the studies above), the unexplained difference in risky asset holdings between Germany and the US may partially result from cultural dimensions as well.

While we suggest directions for future research on the international aspects of risky financial asset holdings, our data are admittedly not suitable for empirically examining the impact of these aspects in detail. Nevertheless, our findings could be a useful starting point for future research to provide a deeper examination of the country-specific features that affect firms' financial portfolio management.

7. Conclusion

Using hand-collected data on financial portfolios of German firms, we show that risky financial asset holdings are not an anomaly unique to the US. We find that German nonfinancial firms invest an average of 11.6% of their financial assets in noncash and risky asset classes. Value-weighted, this percentage increases to more than 25% of financial assets, which is economically substantial. While the average German firm's ratio of risky financial assets to total assets is substantial, it is considerably smaller than that of the average US firm (16.6% of financial assets). Using a Blinder-Oaxaca decomposition, which accounts for compositional differences in firm characteristics, we find that the

[31] In fact, Germany and Japan are the countries with the lowest individualism scores among the Group of Seven (G-7). Individualism and Uncertainty Avoidance are two of the five dimensions of the national culture concept developed in Hofstede (1980) and (2001): Individualism (IDV), Uncertainty Avoidance (UAI), Power Distance (PDI), Masculinity-Femininity (MAS), and Long-Term Orientation (LTO). On dimensions other than Individualism and Uncertainty Avoidance, the differences in country-specific scores between Germany and the US are fairly small: PDI (US: 40; Germany: 35), MAS (US: 62; Germany: 66), and LTO (US: 29; Germany: 31).

risky financial asset holding gap decreases; however, it remains at 3 percentage points. This remaining difference is likely attributable to country-specific effects that affect the relationship between firm characteristics and (risky) financial asset holdings. Our research design is admittedly not suitable for empirically examining the impact of these country-specific effects in detail. Nevertheless, our findings are a useful starting point for future research and deeper analyses of the specific institutional features that affect the regularities found in this and previous US-centered studies. Analyzing these features requires cross-sectional (and ideally, time-series) variation in institutional features, such as tax codes, national culture, financial systems, accounting practices, or legal environments as well as larger, more detailed international data sets on firms' financial portfolios.

With our study, we also contribute by providing evidence from an independent sample, which allows us to examine the broader implications of the US results. One major difference between the US results and ours is that in Germany, precautionary savings needs countervail firms' incentives to hold higher levels of risky financial assets. In addition, and in contrast to the US, there is no evidence that agency problems are responsible for firms' higher risky portfolio investments. Taken together, these results contradict the view that a breakdown of corporate governance may lead to high levels of risky financial asset holdings, and reject concerns about potentially value-reducing activities by firm management – at least for German firms. Nevertheless, similar to the US, there is a large variation in risky financial asset holdings. The ten firms with the largest financial portfolios, on average, hold approximately 46% of their total financial portfolio (which also includes cash) in risky asset classes. While these risky investments provide firms with higher returns if they succeed, they can reduce value and lead to financial distress of firms if they fail. From a policy point of view, this uncertainty in corporate liquidity may be of concern if losses from large risky asset portfolios drag down profits from firms' operating businesses. These concerns are warranted, especially for large firms whose risky portfolios tend to be large.

Furthermore, to the best of our knowledge, not much is known about how nonfinancial firms organize their financial asset management. Qualitative one-on-one interviews (that the authors conducted with senior financial executives of seven sample firms) suggest that industrial firms' financial asset management processes are similar to those of real corporate investments (including approval thresholds, budget limits and different layers of approval; see Hoang et al., 2021). However, the

interview evidence also suggests that asset management teams are relatively small and that firms provide financial managers with considerable discretion about how to spend financial resources within their predefined asset classes.

Finally, our findings raise new questions on the regulation of nonfinancial firms' asset management activities. Investment companies are heavily regulated (e.g., by the UCITS Directive in the EU for open-ended funds or the US federal securities law and the state laws for US public funds), and in some jurisdictions, they must obtain a (banking) license from national financial supervisory authorities (e.g., in Germany). These regulations govern the pool of eligible assets, exposure limits, leverage restrictions, internal control as well as transparency and disclosure rules. This is in stark contrast with the regulation and disclosure requirements of nonfinancial firms' asset management, which are minimal, although they manage similar amounts of financial assets as many investment funds. The average nonfinancial firm in our sample manages a noncash financial portfolio of approximately $782 million, which is substantially more than the approximately $400 million managed by the average mutual fund in Germany (Cremers et al., 2016). This asymmetry in the regulation of financial portfolios invites future research on whether policymakers should regulate nonfinancial firms' asset management more closely.

Figures and Tables

Table 1. Summary Statistics

Our sample comprises all firms that were part of the HDAX from 2009 until 2012, excluding financial institutions (SIC 6000-6999) and utilities (SIC 4900-4999), which results in 269 firm-year observations. Summary statistics on US industrial firms (if available) are from Duchin et al. (2017), henceforth *DGHH*. In addition, we report tests of differences in means (t-test) and medians (sign test) between firms in Germany and firms in the US. For variable definitions, see *Table A2* of the Appendix.

	(1) Germany			(2) US (*DGHH*)			(1)–(2)	
	Mean	Median	SD	Mean	Median	SD	Mean	Median
Financial Portfolio Size	0.162	0.121	0.126	0.175	n/a	n/a	-0.013	n/a
CHE	0.157	0.119	0.126	n/a	n/a	n/a	n/a	n/a
Firm Size	8.572	8.559	1.938	9.189	9.081	1.190	-0.617***	-0.522***
Cash Flow Volatility	0.053	0.030	0.072	0.037	0.027	0.035	0.016***	0.003
R&D Expenditures	0.025	0.005	0.038	0.042	0.006	0.074	-0.017***	-0.001
Market-to-Book	1.566	1.321	0.757	1.965	1.644	1.067	-0.399***	-0.323***
Block Holdings	0.078	0.052	0.098	0.109	0.073	0.134	-0.031***	-0.021***
Family Firm Indicator	0.387	0.000	0.488	n/a	n/a	n/a	n/a	n/a
Cash Flow	0.087	0.080	0.053	0.093	0.088	0.061	-0.006*	-0.008
Leverage	0.209	0.193	0.154	0.250	0.223	0.199	-0.041***	-0.030**
Dividend Indicator	0.814	1.000	0.390	0.676	1.000	0.468	0.138***	0.000
Net Working Capital	0.043	0.038	0.108	0.021	0.019	0.111	0.022***	0.019*
Acquisition Expenses	0.015	0.001	0.038	0.021	0.001	0.049	-0.006**	0.000
Capital Expenditures	0.038	0.031	0.028	0.044	0.031	0.043	-0.006***	0.000

*** p<0.01, ** p<0.05, * p<0.1

Table 2. The Size and Composition of German Firms' Financial Portfolios

Table 2 presents sample-wide, equally-weighted mean values for firms' financial portfolios in relation to (i) total book assets, (ii) the size of total financial portfolios and (iii) CHE. Panel A shows these values by asset class, while Panel B shows these values according to the safe-risky-classification scheme. Asset classes above (below) the dotted line in Panel A are classified as safe (risky) securities. Our sample comprises all firms that were part of the HDAX from 2009 until 2012, excluding financial institutions (SIC 6000-6999) and utilities (SIC 4900-4999). Data on US firms' financial portfolios are from Duchin et al. (2017), henceforth *DGHH*.

Panel A: Size and Asset Types

2009 – 2012		Percent of Book Assets		Percent of Financial Assets		Percent of CHE	
Index		**Germany**	**US** (*DGHH*)	**Germany**	**US** (*DGHH*)	**Germany**	**US** (*DGHH*)
Column		(1)	(2)	(3)	(4)	(5)	(6)
Cash and Cash Equivalents	(S)	12.07	8.79	80.49	68.97	82.26	75.41
Deposits	(S)	1.01	1.22	4.18	4.72	4.21	5.10
Commercial Paper	(S)	0.06	0.44	0.37	1.39	0.39	1.58
Money Market Funds	(S)	0.81	1.72	3.08	6.45	3.19	7.26
Bond Investments		1.00	3.91	6.01	11.14	6.95	15.32
Domestic Government Bonds	(S)	0.02	0.57	0.31	1.90	0.35	2.14
Foreign Government Bonds	(R)	0.01	1.93	0.10	5.33	0.10	7.60
Corporate Bonds	(R)	0.11	1.41	0.34	3.91	0.40	5.58
Other Foreign Gov./Corporate Bonds	(R)	0.86	-	5.25	-	6.10	-
Equity Investments		0.03	0.25	0.18	1.43	0.19	2.96
Mutual Funds	(R)	0.03	0.02	0.08	0.12	0.08	0.14
Equities	(R)	0.01	0.23	0.10	1.31	0.11	2.82
Asset-Backed Securities	(R)	-	0.42	-	1.40	-	2.03
Other Securities	(R)	0.59	0.77	2.87	4.51	3.14	7.27
Aggregated Accounts	(R)	0.66	-	2.82	-	3.32	-
Total Financial Assets		**16.25**	**17.52**	**100.00**	**100.00**	**103.65**	**116.93**

Panel B: Composition According to the Safe-Risky-Classification Scheme

2009 – 2012	Percent of Book Assets		Percent of Financial Assets		Percent of CHE	
Index	**Germany**	**US** (*DGHH*)	**Germany**	**US** (*DGHH*)	**Germany**	**US** (*DGHH*)
Column	(1)	(2)	(3)	(4)	(5)	(6)
Safe Financial Assets	13.98	12.74	88.43	83.43	90.40	91.49
Risky Financial Assets	2.27	4.78	11.57	16.57	13.25	25.44
Total	**16.25**	**17.52**	**100.00**	**100.00**	**103.65**	**116.93**

Table 3. Distribution of Risky Financial Portfolio Size at the Firm-Level

Table 3 shows the equally-weighted average level of risky financial asset holdings for each quintile of our sample grouped by firms' investment in (Panel A) risky financial assets relative to financial assets and (Panel B) risky financial assets relative to book assets. For all panels, we report the within-quintile mean for both (1) the period from 2009 to 2012 and (2) year 2012 only. The sample comprises all firms that were part of the HDAX from 2009 until 2012, excluding financial institutions (SIC 6000-6999) and utilities (SIC 4900-4999). Data on US firms' financial portfolios are from Duchin et al. (2017).

Panel A: Risky Financial Assets / *Financial* Assets (in %)							
Quintile	1	2	3	4	5	Top10 Germany	Top10 US
Column	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Risky Financial Assets/Financial Assets							
2009 – 2012	0.00	0.24	2.65	11.13	44.47	46.34	n/a
2012	0.00	0.46	2.79	13.82	47.25	54.22	91.83
Panel B: Risky Financial Assets / *Book* Assets (in %)							
Quintile	1	2	3	4	5	Top10 Germany	Top10 US
Column	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Risky Financial Assets/Book Assets							
2009 – 2012	0.00	0.03	0.24	1.32	9.93	12.17	n/a
2012	0.00	0.03	0.31	1.43	10.58	13.04	55.77

Table 4. Distribution of Risky Financial Portfolio Size at the Industry-Level

Table 4 shows the equally-weighted average level of risky financial assets relative to (i) total financial assets and to (ii) book assets for German and US firms grouped by their industry affiliation based on the Fama-French five-industry classification scheme. In addition, we report tests of differences in industry means (t-test) between German and US firms. The sample comprises all firms that were part of the HDAX from 2009 until 2012, excluding financial institutions (SIC 6000-6999) and utilities (SIC 4900-4999). Data on US firms' financial portfolios are from Duchin et al. (2017) and from Compustat.

	Average Risky Financial Portfolio Size by Industry					
	Percent of Financial Assets			Percent of Book Assets		
	US	Germany	Δ	US	Germany	Δ
Column	(1)	(2)	(3)	(4)	(5)	(6)
Technology	26.86	5.41	21.45***	11.07	1.34	9.73***
Healthcare	26.41	12.07	14.34***	7.35	2.77	4.58***
Consumer	11.12	18.11	-6.99**	2.21	1.63	0.58*
Manufacturing	10.12	11.11	-0.99	1.44	2.49	-1.05*
Other	12.34	28.41	-16.07**	1.88	5.08	-3.20**

*** p<0.01, ** p<0.05, * p<0.1

Table 5. Determinants of German Firms' Financial Portfolio Size

Table 5 reports OLS regression estimates explaining the determinants of German industrial firms' financial portfolio size. Panel A (columns 1-5) shows our baseline specification regressing financial asset holdings on the proxies for the transaction costs and the precautionary savings motive as well as a vector of additional controls. Panel B (columns 6-9) shows our agency specification, which additionally includes corporate governance proxies – institutional block holdings and family firm status. The sample comprises all firms that were part of the HDAX from 2009 until 2012, excluding financial institutions (SIC 6000-6999) and utilities (SIC 4900-4999). All regressions include industry and year fixed effects. Standard errors (in brackets) are heteroscedasticity consistent and clustered at the firm level.

Dependent variable		Financial Assets / Book Assets								
Column	Exp. Relation	Panel A: Baseline Specification					Panel B: Agency Specification			
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Transaction Cost Motive										
Firm Size	-	-0.031***	-0.022***			-0.016***			-0.015***	-0.016***
		[0.007]	[0.005]			[0.005]			[0.005]	[0.005]
Precautionary Savings Motive										
Cash Flow Volatility	+			0.681***	0.512***	0.424***			0.448***	0.416***
				[0.094]	[0.088]	[0.083]			[0.085]	[0.086]
R&D Expenditures	+			1.380***	1.145***	1.229***			1.264***	1.225***
				[0.248]	[0.211]	[0.191]			[0.189]	[0.187]
Market-to-Book	+			0.034**	0.058***	0.047***			0.048***	0.047***
				[0.016]	[0.015]	[0.015]			[0.015]	[0.015]
Agency Motive										
Block Holdings	-						0.070		-0.095	
							[0.104]		[0.084]	
Family Firm Indicator	-							-0.023		-0.004
								[0.029]		[0.019]
Controls										
Cash Flow	-		-0.052		-0.680***	-0.633***			-0.661***	-0.629***
			[0.191]		[0.187]	[0.193]			[0.190]	[0.199]
Leverage	-		-0.363***		-0.251***	-0.218***			-0.218***	-0.218***
			[0.087]		[0.076]	[0.073]			[0.072]	[0.073]

Dividend Indicator	-		-0.031		-0.004	0.016			0.014	0.017
			[0.027]		[0.016]	[0.015]			[0.015]	[0.015]
Net Working Capital	-		-0.208*		-0.062	-0.120			-0.113	-0.123
			[0.111]		[0.083]	[0.088]			[0.089]	[0.091]
Acquisition Expenses	-		-0.257*		-0.407***	-0.431***			-0.416***	-0.428***
			[0.154]		[0.127]	[0.131]			[0.131]	[0.132]
Capital Expenditure	-		0.290		0.244	0.363			0.429	0.360
			[0.439]		[0.386]	[0.382]			[0.402]	[0.376]
Industry FE		X	X	X	X	X	X	X	X	X
Year FE		X	X	X	X	X	X	X	X	X
Nobs		269	269	269	269	269	269	269	269	269
Adjusted R^2		0.230	0.420	0.450	0.570	0.610	0.040	0.050	0.610	0.600

*** p<0.01, ** p<0.05, * p<0.1

Table 6. Determinants of German Firms' Financial Portfolio Composition

Table 6 reports the 2SLS regression estimates explaining the determinants of German industrial firms' financial portfolio composition. Panel A shows our baseline specification that regresses risky financial asset holdings on the proxies for the precautionary savings motive, financial portfolio size as well as a vector of additional controls. Panel B shows our agency specification. Panel C shows our CEO specification, which additionally includes CEO characteristics such as age, tenure and gender. The sample comprises all firms that were part of the HDAX from 2009 until 2012, excluding financial institutions (SIC 6000-6999) and utilities (SIC 4900-4999). In addition, when analyzing *option-based compensation*, we exclude firm-year observations with missing managerial compensation data as well as firm-year observations with two CEOs (i.e., Co-CEOs). All regressions include industry and year fixed effects. Standard errors (in brackets) are heteroscedasticity consistent and clustered at the firm level.

Model	Panel A: Baseline			Panel B: Agency		Panel C: CEO
	OLS	2SLS - First Stage	2SLS - Second Stage	2SLS - Second Stage		2SLS - Second Stage
Column	(1)	(2)	(3)	(4)	(5)	(6)
Financial Portfolio Size	0.602**					
	[0.242]					
Unexpected Cash Flow		0.445***				
		[0.128]				
Financial Portfolio Size*			2.173**	2.175**	2.193**	3.222*
			[1.047]	[1.053]	[1.047]	[1.689]
Firm Size	0.026**	-0.015***	0.051***	0.051***	0.052***	0.057**
	[0.011]	[0.005]	[0.019]	[0.019]	[0.019]	[0.028]
Precautionary Savings Motive						
Cash Flow Volatility	-0.325	0.385***	-0.990*	-0.999*	-0.980*	-1.246
	[0.219]	[0.088]	[0.568]	[0.603]	[0.578]	[0.851]
R&D Expenditures	-0.829	1.190***	-2.759*	-2.773*	-2.774*	-3.449*
	[0.510]	[0.195]	[1.432]	[1.473]	[1.439]	[2.099]
Market-to-Book	-0.032	0.047***	-0.105*	-0.105*	-0.106*	-0.189*
	[0.023]	[0.015]	[0.059]	[0.061]	[0.059]	[0.106]
Agency Motive						
Block Holdings				0.031		
				[0.257]		
Family Firm Indicator					0.011	
					[0.039]	
Risk-Taking Motive						
Option-Based Compensation						0.087
						[0.166]
Other Controls	X	X	X	X	X	X
CEO Characteristics						X
Industry FE	X	X	X	X	X	X
Year FE	X	X	X	X	X	X
Nobs	269	269	269	269	269	217
Adjusted R^2	0.260	0.620				

*** p<0.01, ** p<0.05, * p<0.1

Table 7. Firms' Financial Portfolio Composition: Difference-in-Difference (DiD) Regression

Table 7 reports DiD regression estimates of the impact that the euro crisis had on German firms' financial portfolio composition. As a sovereign debt crisis, the euro crisis resulted in tighter bank lending, which we exploit as an exogenous shock on firms' (refinancing) risk and ultimately, their precautionary savings demand. In particular, our DiD specifications regress risky financial assets (relative to (i) total financial assets and to (ii) book assets) on the set of firm-specific covariates from our baseline OLS specification for the composition of German firms' financial portfolios. The sample comprises all firms that were part of the HDAX from 2009 until 2012 and excludes financial institutions (SIC 6000-6999) and utilities (SIC 4900-4999). All regressions include industry fixed effects. Standard errors (in brackets) are heteroscedasticity-consistent and clustered at the firm level. For variable definitions, see *Table A2* of the Appendix.

Model	Difference-in-Differences (DiD)	
Column	Risky Financial Assets / Financial Assets	Risky Financial Assets / Book Assets
	(1)	(2)
High-Exposure × Post-Shock	-0.059*	-0.019*
	[0.035]	[0.010]
High-Exposure	0.059	0.019
	[0.057]	[0.018]
Post-Shock	0.060**	0.015**
	[0.026]	[0.008]
Controls	X	X
Industry FE	X	X
Nobs	260	260
Adjusted R2	0.290	0.330

*** p<0.01, ** p<0.05, * p<0.1

Table 8. Firms' Risky Financial Asset Holdings: Detailed Decomposition

Table 8 reports detailed decomposition results of German and US firms' risky financial asset holdings (defined as the share of risky assets in firms' financial portfolios). We use a Blinder-Oaxaca decomposition. Column 1 shows the OLS regression coefficients for Germany. Columns 2-4 show the mean covariate values of the average firm in Germany and the US, while column 5 shows the contribution of each covariate to the composition effect (explained component). The sample comprises all firms that were part of the HDAX from 2009 until 2012, excluding financial institutions (SIC 6000-6999) and utilities (SIC 4900-4999). Data on covariates of US firms are from Duchin et al. (2017), henceforth *DGHH*, and from Compustat.

Model		Detailed Decomposition of the Explained Component			
	OLS Regression Coefficient/ Effect Size (DE)	Mean Firm Characteristics			Contribution of Each Covariate to the Explained Component
		US (*DGHH*)	DE	Δ (US-DE)	
Column	(1)	(2)	(3)	(4)	(5)
Firm Size	0.026	9.189	8.572	0.617	0.016
Financial Portfolio Size	0.602	0.175	0.162	0.013	0.008
Precautionary Savings Motive					
Cash Flow Volatility	-0.325	0.037	0.053	-0.016	0.005
Market-to-Book	-0.032	1.965	1.566	0.399	-0.013
R&D Expenditures	-0.829	0.042	0.025	0.017	-0.014
Controls					
Net Working Capital	-0.296	0.021	0.043	-0.022	0.007
Capital Expenditures	0.702	0.044	0.038	0.006	0.004
Dividend Indicator	-0.003	0.676	0.814	-0.138	0.000
Cash Flow	-0.107	0.093	0.087	0.006	-0.001
Acquisition Expenses	-0.136	0.021	0.015	0.006	-0.001
Leverage	-0.184	0.250	0.209	0.041	-0.008
Industry Effects					
Consumer	0.125	0.262	0.112	0.150	0.019
Manufacturing	0.031	0.247	0.372	-0.125	-0.004
Healthcare	0.105	0.093	0.134	-0.041	-0.004
Other	0.104	0.122	0.074	0.048	0.005
Total					0.020

Appendix

A1. Data Collection Process

We hand-collect comprehensive data on the financial asset holdings of firms, exploiting the balance sheets and footnotes of firms' annual reports. First, we gather data on firms' financial assets using their fair value measurement footnotes. IAS 39 / IFRS 7 require firms to disclose the fair value amount of their financial assets categorized by appropriate asset classes. Second, we use firms' annual reports to identify the exact securities included in the reported asset classes and evaluate whether these assets are nonoperating financial assets. Finally, as firms sometimes also disclose information regarding their financial asset holdings in their balance sheets, we supplement our data with the additional information from firms' balance sheets if necessary.

We use a representative example to illustrate our data collection process in detail: the 2011 annual report of SAP. *Figure A1* shows the fair value measurement footnote. The footnote tabulates SAP's financial assets and its liabilities at fair value. Following Duchin et al. (2017), we focus our analysis on firms' total nonoperating financial assets excluding derivatives.

Figure A1: SAP AG - Fair Value Measurement Footnote

Classification of Financial Instruments
€ millions

				2011
	Level 1	Level 2	Level 3	Total
Financial assets				
Debt investments	400	0	0	400
Equity investments	18	21	0	39
Available-for-sale financial assets	418	21	0	439
Derivative financial assets	0	165	0	165
Total	**418**	**186**	**0**	**604**
Financial liabilities				
Derivative financial liabilities	0	222	0	222
Total	**0**	**222**	**0**	**222**

Figure A1. This figure shows SAP's 2011 fair value measurement footnote. SAP invested €400 million of its financial assets in debt investments and another €39 million in equity investments. Source: SAP annual report 2011, p. 246

Figure A1 reveals that in 2011, SAP invested €400 million of its financial assets in debt investments and another €39 million in equity investments, resulting in €439 million available-for-sale financial assets. SAP's annual report classifies its available-for-sale financial assets as nonoperating "[…] debt investments in German government bonds and equity investments in listed and unlisted securities" (SAP annual report 2011, p. 209). Therefore, we include both values – €400 million in *domestic government bonds* and €39 million in *equities* – in our 2011 financial portfolio measure for SAP.

Finally, we determine whether SAP discloses additional nonoperating financial assets in its balance sheet. In doing this, we identify €4.97 billion in cash and cash equivalents that is not tabulated in SAP's fair value measurement footnote. Thus, we also include this amount in our 2011 financial portfolio measure for SAP. Ultimately, SAP's nonoperating financial portfolio consists of €4.97 billion in *cash and cash equivalents*, €400 million in *domestic government bonds* and €39 million in *equities*.

A2. Variable Definitions

We adopt the variable definitions of Duchin et al. (2017).

Variable	Definition	Source
Size	Size is defined as the natural logarithm of total book assets (IQ_TOTAL_ASSETS) in million US-Dollars.	CapitalIQ
Cash Flow	Cash flow is defined as EBITDA (IQ_EBITDA) minus interest (IQ_CASH_INTEREST) and taxes (IQ_CASH_TAXES) divided by total book assets (IQ_TOTAL_ASSETS).	CapitalIQ
Cash Flow Volatility	Cash flow volatility is defined as the 10-year rolling window standard deviation of cash flow (see definition above).	CapitalIQ
R&D Expenditures	R&D expenditures is defined as research and development expenses (IQ_RD_EXP), assigned zero for missing R&D data, divided by total book assets (IQ_TOTAL_ASSETS).	CapitalIQ
Market-to-Book	Market-to-book is the market value of firm assets, and it is defined as total book assets (IQ_TOTAL_ASSETS) minus book equity (IQ_TOTAL_EQUITY) plus market value of equity (IQ_MARKETCAP) divided by total book assets (IQ_TOTAL_ASSETS).	CapitalIQ
Leverage	Leverage is defined as total book debt (IQ_TOTAL_DEBT) divided by total book assets (IQ_TOTAL_ASSETS).	CapitalIQ
Dividend Indicator	The dividend indicator is an indicator variable that is set to one if a firm paid cash dividends in a given fiscal year; otherwise, it is set to zero.	CapitalIQ
Net Working Capital	Net working capital is defined as current book assets (IQ_TOTAL_CA) minus current book liabilities (IQ_TOTAL_CL) divided by total book assets (IQ_TOTAL_ASSETS).	CapitalIQ
Acquisition Expenditures	Acquisition expenditures is defined as cash acquisitions (IQ_CASH_ACQUIRE_CF) divided by total book assets (IQ_TOTAL_ASSETS).	CapitalIQ
Capital Expenditures	Capital expenditures is defined as capital expenditures (IQ_CAPEX) divided by total book assets (IQ_TOTAL_ASSETS).	CapitalIQ
Block Holdings	Block holdings is defined as the sum of all ownership positions of institutional investors greater than 5% held in the latest quarter of the respective fiscal year.	CapitalIQ
Family Firm Indicator	The family firm indicator is an indicator variable set to one if a firm is a family firm according to Shleifer and Vishny (1986); otherwise, it is set to zero.	CapitalIQ
Euro Crisis Exposure	The euro crisis exposure is defined as the sum of long-term debt as of 2009 (IQ_LTD_DUE_CY, IQ_LTD_DUE_CY1, and IQ_LTD_DUE_CY2) that expires during the euro crisis period (2010-2012) divided by total book assets (IQ_TOTAL_ASSETS) for 2009, the last year before the crisis.	CapitalIQ
High-Exposure	High-exposure is an indicator variable set to one if a firm's euro crisis exposure is higher than that of the median firm; otherwise, it is set to zero.	CapitalIQ

Post-Shock	Post-Shock is an indicator variable set to one for all years after the beginning of the euro crisis including the starting year, 2010; otherwise, it is set to zero.	CapitalIQ
Option-Based Compensation	Option-based compensation is the share of a CEO's annual option-based compensation in relation to his or her total compensation.	Beck, Friedl, and Schäfer (2020)
Age	Age corresponds to the age of a firm's CEO (in years) during a given fiscal year.	Beck, Friedl, and Schäfer (2020)
Tenure	Tenure corresponds to the length of time that a given firm's CEO has been with the firm (in years) for a given fiscal year.	Beck, Friedl, and Schäfer (2020)
Female	Female is an indicator variable that is set to one if the CEO of a firm is a woman; otherwise, it is set to zero.	Beck, Friedl, and Schäfer (2020)

A3. The Value-Weighted Composition of German Firms' Financial Portfolios

Table A4 reports value-weighted mean values for financial portfolios of German and US firms by asset class in relation to (i) total book assets, (ii) the size of total financial asset portfolios and (iii) CHE according to the safe-risky-classification scheme. Our sample comprises all firms that were part of the HDAX from 2009 until 2012, excluding financial institutions (SIC 6000-6999) and utilities (SIC 4900-4999). Data on US firms' financial portfolios are from Duchin et al. (2017), henceforth *DGHH*, and comprise year 2012 only.

2009-2012	Percent of Book Assets		Percent of Financial Assets		Percent of CHE	
Index	**Germany**	**US** (*DGHH*)	**Germany**	**US** (*DGHH*)	**Germany**	**US** (*DGHH*)
Column	(1)	(2)	(3)	(4)	(5)	(6)
Cash and Cash Equivalents	6.90	6.78	70.89	45.23	74.70	56.36
Deposits	0.20	0.54	2.01	3.60	2.12	4.49
Commercial Paper	0.03	0.30	0.26	2.01	0.27	2.51
Money Market Funds	0.11	0.73	1.08	4.90	1.14	6.10
Bond Investments	0.04	0.89	0.37	5.93	0.39	7.37
Domestic Government Bonds	0.04	0.89	0.37	5.93	0.39	7.37
Total Safe Financial Assets	7.27	9.24	74.61	61.67	78.63	76.83
Bond Investments	1.69	3.92	17.33	26.18	18.26	32.62
Foreign Government Bonds	0.01	2.29	0.08	15.29	0.09	19.05
Corporate Bonds	0.14	1.63	1.43	10.89	1.51	13.57
Other Foreign Gov./Corporate Bonds	1.54	-	15.82	-	16.67	-
Equity Investments	0.01	0.31	0.15	2.07	0.16	2.58
Mutual Funds	0.00	0.02	0.02	0.10	0.02	0.13
Equities	0.01	0.29	0.13	1.97	0.14	2.45
Asset-Backed Securities	-	0.53	-	3.55	-	4.43
Other Securities	0.20	0.99	2.10	6.53	2.21	8.14
Aggregated Accounts	0.57	-	5.80	-	6.11	-
Total Risky Financial Assets	2.47	5.75	25.39	38.33	26.75	47.77
Total Financial Assets	9.74	14.99	100.00	100.00	105.37	124.60

A4. Empirical Design – Decomposition of Mean Outcome Differences

To address concerns that our cross-country results are only driven by differences in firm characteristics, we decompose the observed (risky) financial asset difference between German (group A; base group) and US (group B) firms using a Blinder-Oaxaca decomposition (Blinder, 1973; Oaxaca, 1973). We consider the case of financial asset holdings as the outcome variable. Variable definitions are in *Table A2* of the Appendix.

The overall difference in $Financial\ assets_g$ between groups B and A,

$$\Delta = \overline{Financial\ assets_B} - \overline{Financial\ assets_A}\ ,$$

can be written as follows:

$$\Delta = \underbrace{\sum_{j=1}^{J}(\overline{X}_{B,j} - \overline{X}_{A,j})\hat{\beta}_{A,j}}_{Explained} + \underbrace{(\hat{\alpha}_{B,0} - \hat{\alpha}_{A,0}) + \sum_{j=1}^{J}\overline{X}_{B,j}(\hat{\beta}_{B,j} - \hat{\beta}_{A,j})}_{Unexplained} \qquad \text{(A1)}$$

where $\hat{\alpha}_{g,0}$ and $\hat{\beta}_{g,j}$ $(j = 1, ..., J)$ represent the intercept and slope coefficients of the regressions for groups $g = A, B$. $\overline{X}_{g,j}$ $(j = 1, ..., J)$ are the respective average values of the firm-level characteristics determining firms' financial asset holdings for groups A and B.

The first component in equation (A1) is what is commonly referred to as the *explained* component, which results from compositional differences in firm characteristics. The second component is the *unexplained* component. This unexplained component not only corresponds to differences in the effect size or the intercept of the regression point estimates but also subsumes the effects of differences in unobservable predictors. The literature typically interprets the unexplained component as an effect similar to a treatment effect (e.g., Fortin, Lemieux, and Firpo, 2011).

We begin the Blinder-Oaxaca decomposition by fitting a regression model to the base group using the relevant determinants of financial asset holdings as covariates. Afterward, we predict the outcome for the average firm in group A as if they had the same mean characteristics as the average firm in group B. The difference between this predicted mean and the observed mean for the average firm in group A is the explained difference between the two groups. The remainder of the original between-group difference of the average firms in groups A and B corresponds to the unexplained component. To further divide the explained difference into portions attributable to the differing endowments of the explanatory variables, we calculate $(\overline{X}_{B,j} - \overline{X}_{A,j})\hat{\beta}_{A,j}$ for each covariate j $(j = 1, ..., J)$. This value represents the respective contribution of the jth covariate to the compositional difference (explained component) between groups A and B.

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Internet Appendix

Do Nonfinancial Firms Hold Risky Financial Assets? Evidence from Germany

Oct 27, 2022

Not for Publication

IA1. Comparison of IAS/IFRS and US-GAAP with Respect to the Fair Value Measurement of Financial Instruments

Topic	**IAS 39 and IFRS 7** Valid for the sample period from 2009 to 2012	**US-GAAP and ASC820** Introduced as SFAS 157 in 2009 Amended in 2011 as ASC820	**Comment**
Fair Value	IAS 39.9: "Fair value is the amount for which an asset could be exchanged, or a liability settled, between knowledgeable, willing parties in an arm's length transaction." (Deloitte, 2012)	ASC 820 (SFAS 157): "Fair value is the price that would be received to sell an asset […] in an orderly transaction between market participants at the measurement date." (Bauce et al., 2017)	Identical fair value definitions in IFRS and US-GAAP.
Valuation Technique	IAS 39 Appendix A, paragraphs AG69-82: The valuation techniques used to determine fair value are as follows: 1.) Market approach 2.) Income approach 3.) Cost approach	ASC 820-10-35: The valuation techniques used to determine the fair value of financial assets are as follows: 1.) Market approach 2.) Income approach 3.) Cost approach	Identical valuation approaches for the fair value of financial instruments in IFRS and US-GAAP.
Inputs to Valuation Technique	IFRS 7.27A-27B: Introduction of "[…] 3 levels of inputs based on the lowest level of input significant to the overall fair value: Level 1 – quoted prices for similar instruments Level 2 – directly observable market inputs other than Level 1 inputs Level 3 – inputs not based on observable market data" (Deloitte, 2014)	ASC 820-10-20: Following Bauce et al. (2017), ASC820 classifies the required valuation inputs according to three different levels: Level 1 – unadjusted quoted prices for similar assets Level 2 – market inputs other than quoted prices (i.e., level 1) that are observable for the asset Level 3 – inputs for the asset unobservable on the market	Identical input categorizations for the valuation of fair value financial instruments in IFRS and US-GAAP.
Disclosure	IFRS7.25-30: The following minimum disclosures "[…] about fair values of each class of financial asset and financial liability […]" (Deloitte, 2014) are required after initial recognition: 1.) the fair value measurement at the end of each reporting period 2.) the level of the fair value hierarchy used to determine the fair value measurements (Levels 1, 2 or 3)	ASC820-50-1: An entity must disclose the following information after initial recognition for each class of its financial assets and liabilities measured at fair value in their financial statement: 1.) the fair value measurement at the end of each reporting period 2.) the level of the fair value hierarchy used to determine the fair value measurements (Levels 1, 2 or 3)	Identical disclosure requirements with regard to fair value financial instruments in IFRS and US-GAAP.

Level of Disclosure Disaggregation	IFRS 7.6: "Certain other disclosures are required by class of financial instrument (for example the fair value of financial assets and financial liabilities). For those disclosures an entity must group its financial instruments into classes of similar instruments as appropriate to the nature of the information presented." (Deloitte, 2014) Determining appropriate classes for the assets and liabilities that must be disclosed requires firms to make judgments.	SFAS 157.32: Equity and debt security classes shall be specified as principal security types in accordance with paragraph 19 of FASB Statement No.115. SFAS 115.19: Defines principal security types as follows: • Equity securities, • Debt securities issued by the US Treasury and other US government corporations and agencies, • Debt securities issued by US states and the political subdivisions of the states, • Debt securities issued by foreign governments, • Corporate debt securities, • Mortgage-backed securities, and • Other debt securities.	US-GAAP defines the classes of financial assets to be disclosed at fair value. IFRS does not define these classes. Nevertheless, both accounting standards require the disclosure of fair value financial asset classes and are therefore comparable in terms of the level of disclosure disaggregation that they require.

IA2. The Composition of Firms' Financial Portfolios in 2018

Table IA2 reports equally-weighted mean values for financial portfolios of German firms during the original sample period (2009–2012) and in 2018 by asset class in relation to (i) total book assets and (ii) the size of total financial asset portfolios according to the safe-risky-classification scheme. We report tests of differences in means (t-test) between the two sample periods. Our sample comprises all firms that were part of the HDAX from 2009 to 2012 and excludes financial institutions (SIC 6000-6999) and utilities (SIC 4900-4999).

	Percent of Book Assets			Percent of Financial Assets		
Sample Period	**2009-2012**	**2018**	**Difference**	**2009-2012**	**2018**	**Difference**
Column	(1)	(2)	(3)	(4)	(5)	(6)
Cash and Cash Equivalents	12.07	10.60	-1.47	80.49	74.91	-5.58*
Deposits	1.01	2.09	1.08	4.18	8.96	4.78*
Commercial Paper	0.06	0.29	0.23	0.37	1.45	1.08
Money Market Funds	0.81	0.54	-0.27*	3.08	1.63	-1.45*
Bond Investments	0.02	0.04	0.02	0.31	0.47	0.16
Domestic Government Bonds	0.02	0.04	0.02	0.31	0.47	0.16
Total Safe Financial Assets	13.98	13.57	-0.41	88.43	87.41	-1.02
Bond Investments	0.98	1.00	0.02	5.70	4.94	-0.76
Foreign Government Bonds	0.01	0.00	-0.01	0.10	0.00	-0.10
Corporate Bonds	0.11	0.07	-0.04	0.34	0.37	0.03
Other Foreign Gov./Corporate Bonds	0.86	0.93	0.07	5.25	4.57	-0.68
Equity Investments	0.03	0.41	0.38*	0.18	1.64	1.46**
Mutual Funds	0.03	0.38	0.35	0.08	1.39	1.31*
Equities	0.01	0.03	0.02	0.10	0.25	0.15
Asset-Backed Securities	-	-	-	-	-	-
Other Securities	0.59	0.21	-0.38***	2.87	2.61	-0.26
Aggregated Accounts	0.66	0.55	-0.11	2.82	3.40	0.58
Total Risky Financial Assets	2.27	2.17	-0.10	11.57	12.59	1.02
Total Financial Assets	16.25	15.74	-0.51	100.00	100.00	0.00

*** p<0.01, ** p<0.05, * p<0.1

IA3. Determinants of German Firms' Financial Portfolio Size: Full Cross-Section

Table IA3 reports OLS regression estimates of the determinants of German industrial firms' financial portfolio size. Unlike our regression estimates in Table 5, the estimates in this table do not include industry-fixed effects to examine the full cross-sectional variation of our sample. Panel A (columns 1-5) shows our baseline specification that regresses financial asset holdings on the proxies for the transaction costs and the precautionary savings motive as well as a vector of additional controls. Panel B (columns 6-11) shows our agency specification, which additionally includes corporate governance proxies – institutional block holdings and family firm status. The sample comprises all firms that were part of the HDAX from 2009 until 2012 and excludes financial institutions (SIC 6000-6999) and utilities (SIC 4900-4999). All regressions include year fixed effects. Standard errors (in brackets) are heteroscedasticity-consistent and clustered at the firm level.

Dependent variable		Financial Assets / Book Assets								
Column	Exp. Relation	Panel A: Baseline Specification					Panel B: Agency Specification			
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Transaction Cost Motive										
Firm Size	-	-0.031***	-0.021***			-0.015***			-0.014***	-0.015***
		[0.006]	[0.005]			[0.005]			[0.005]	[0.005]
Precautionary Savings Motive										
Cash Flow Volatility	+			0.658***	0.484***	0.385***			0.407***	0.374***
				[0.088]	[0.092]	[0.089]			[0.092]	[0.091]
R&D Expenditures	+			1.212***	1.048***	1.129***			1.140***	1.127***
				[0.240]	[0.211]	[0.191]			[0.190]	[0.187]
Market-to-Book	+			0.033*	0.060***	0.050***			0.051***	0.051***
				[0.017]	[0.016]	[0.016]			[0.016]	[0.016]
Agency Motive										
Block Holdings	-						0.013		-0.093	
							[0.116]		[0.079]	
Family Firm Indicator	-							-0.027		-0.008
								[0.027]		[0.019]
Controls										
Cash Flow	-		-0.033		-0.716***	-0.703***			-0.727***	-0.691***
			[0.188]		[0.194]	[0.195]			[0.192]	[0.203]

Leverage	-		-0.333***		-0.240***	-0.197***			-0.200***	-0.195***
			[0.085]		[0.074]	[0.073]			[0.071]	[0.073]
Dividend Indicator	-		-0.039		-0.014	0.008			0.005	0.009
			[0.030]		[0.016]	[0.016]			[0.016]	[0.016]
Net Working Capital	-		-0.199*		-0.134	-0.171*			-0.167*	-0.175*
			[0.102]		[0.081]	[0.087]			[0.088]	[0.088]
Acquisition Expenses	-		-0.263*		-0.396***	-0.431***			-0.414***	-0.426***
			[0.140]		[0.128]	[0.131]			[0.131]	[0.129]
Capital Expenditures	-		0.282		0.465	0.614*			0.687*	0.596*
			[0.388]		[0.353]	[0.340]			[0.366]	[0.330]
Industry FE										
Year FE		X	X	X	X	X	X	X	X	X
Nobs		269	269	269	269	269	269	269	269	269
Adjusted R^2		0.220	0.390	0.410	0.560	0.590	-0.010	0.000	0.590	0.590

*** p<0.01, ** p<0.05, * p<0.1

IA4. Determinants of German Firms' Financial Portfolio Composition: Full Cross-Section

Table IA4 reports 2SLS regression estimates of the determinants of German industrial firms' financial portfolio composition. Unlike the regression estimates in Table 6, the estimates in this table do not include industry-fixed effects to examine the full cross-sectional variation of our sample. Panel A shows our baseline specification that regresses risky financial asset holdings on the proxies for the precautionary savings motive and financial portfolio size as well as a vector of additional controls. Panel B shows our agency specification. Panel C shows our CEO specification, which additionally includes CEO characteristics such as age, tenure and gender. The sample comprises all firms that were part of the HDAX from 2009 until 2012 and excludes financial institutions (SIC 6000-6999) and utilities (SIC 4900-4999). In addition, we exclude firm-year observations with missing managerial compensation data and firm-year observations with two CEOs (i.e., Co-CEOs) when analyzing *option-based compensation*. All regressions include year fixed effects. Standard errors (in brackets) are heteroscedasticity-consistent and clustered at the firm level.

Model	Panel A: Baseline			Panel B: Agency		Panel C: CEO
	OLS	2SLS - First Stage	2SLS - Second Stage	2SLS - Second Stage		2SLS - Second Stage
Column	(1)	(2)	(3)	(4)	(5)	(6)
Financial Portfolio Size	0.660***					
	[0.216]					
Unexpected Cash Flow		0.424***				
		[0.130]				
Financial Portfolio Size*			2.101*	2.105*	2.141*	2.982
			[1.156]	[1.148]	[1.175]	[2.169]
Firm Size	0.034***	-0.014***	0.055***	0.056***	0.056***	0.057**
	[0.010]	[0.005]	[0.018]	[0.018]	[0.019]	[0.026]
Precautionary Savings Motive						
Cash Flow Volatility	-0.363*	0.347***	-0.919*	-0.911*	-0.904*	-1.100
	[0.200]	[0.090]	[0.525]	[0.541]	[0.529]	[0.841]
R&D Expenditures	-0.727	1.101***	-2.355*	-2.355*	-2.394*	-2.786
	[0.448]	[0.200]	[1.288]	[1.295]	[1.305]	[2.237]
Market-to-Book	-0.016	0.051***	-0.089	-0.089	-0.092	-0.166
	[0.026]	[0.016]	[0.067]	[0.067]	[0.069]	[0.140]
Agency Motive						
Block Holdings				-0.040		
				[0.230]		
Family Firm Indicator					0.023	
					[0.037]	
Risk-Taking Motive						
Option-Based Compensation						0.040
						[0.185]
Other Controls	X	X	X	X	X	X
CEO Characteristics						
Industry FE						
Year FE	X	X	X	X	X	X
Nobs	269	269	269	269	269	217
Adjusted R^2	0.220	0.600				

*** p<0.01, ** p<0.05, * p<0.1

IA5. Empirical Design – Determinants of German Firms' Financial Portfolio Composition

We employ a 2SLS regression model as proposed in Duchin et al. (2017) to analyze the determinants of German firms' financial portfolio composition (*H4-H7*). This model aims to address endogeneity concerns about the joint determination of firms' financial portfolio size and their composition (i.e., firms' risky financial asset holdings; *Risky_FA*).

The 2SLS regression exploits unexpected cash flow shocks as an instrument for *actual* financial portfolio size (see Duchin et al., 2017). Unexpected cash flow shocks (*Unexpected_CF*) are the residuals ($\varepsilon_{i,t}$) from the following time-series model:

$$\begin{aligned} CF_{i,t} - CF_{i,t-1} = \alpha + \beta_1(CF_{i,t-1} - CF_{i,t-2)}) + \beta_2(CF_{i,t-2} - CF_{i,t-3)}) \\ + \beta_3(CF_{i,t-3} - CF_{i,t-4)}) + \varepsilon_{i,t} \end{aligned} \tag{IA1}$$

To mitigate the impact of outliers on our results, we winsorize *Unexpected_CF* at the 1st and 99th percentiles. Afterwards, we use *Unexpected_CF* as an instrument to determine the size of firms' financial portfolios in the following model:

$$FP\_Size_{i,t} = \alpha_0 + \alpha_1 Unexpected\_CF_{i,t} + \beta' X_{i,t} + \sum_t year_t + \sum_j ind_j + \varepsilon^T_{i,t} \tag{IA2}$$

where $X_{i,t}$ represents a vector of traditional determinants of cash holdings used in the literature (e.g., Opler et al., 1999; Bates, Kahle and Stulz, 2009). Moreover, we include industry and year fixed effects and cluster standard errors at the firm level. For our second-stage model, we use the fitted financial portfolio size values from equation (IA2) and estimate the following regression:

$$Risky\_FA_{i,t} = \alpha_0 + \alpha_1 FP\_Size^*_{i,t} + \beta' X_{i,t} + \sum_t year_t + \sum_j ind_j + \varepsilon^R_{i,t} \tag{IA3}$$

where $Risky\_FA_{i,t}$ is the ratio of a firm's risky financial assets to its total financial assets. $FP\_Size^*_{i,t}$ is the predicted value of a firm's financial portfolio size based on the first-stage model. $X_{i,t}$ represents the vector of explanatory variables. We again control for industry and year fixed effects and cluster standard errors at the firm level.

Variable definitions are in *Table A2* of the Appendix.

IA6. Firms' Financial Asset Holdings: Decomposition Results

Table IA6 reports decomposition results of German and US firms' financial portfolio size (defined as financial assets divided by total book assets). We use a Blinder-Oaxaca decomposition. Column 1 shows the OLS regression coefficients for Germany. Columns 2-4 show the mean covariate values of the average firm in Germany and the US, while column 5 shows the contribution of each covariate to the composition effect (explained component). The sample comprises all firms that were part of the HDAX from 2009 to 2012 and excludes financial institutions (SIC 6000-6999) and utilities (SIC 4900-4999). Data on covariates of US firms are from Duchin et al. (2017), henceforth *DGHH*, and from Compustat.

Model	Blinder-Oaxaca Decomposition				
	OLS Regression Coefficient/ Effect Size (DE)	Mean Firm Characteristics			Contribution of Each Covariate to the Explained Component
		US (*DGHH*)	DE	Δ (US-DE)	
Column	(1)	(2)	(3)	(4)	(5)
Transaction Cost Motive					
Firm Size	-0.016	9.189	8.572	0.617	-0.010
Precautionary Savings Motive					
Cash Flow Volatility	0.424	0.037	0.053	-0.016	-0.007
Market-to-Book	0.047	1.965	1.566	0.399	0.019
R&D Expenditures	1.229	0.042	0.025	0.017	0.021
Controls					
Net Working Capital	-0.120	0.021	0.043	-0.022	0.003
Capital Expenditures	0.363	0.044	0.038	0.006	0.002
Dividend Indicator	0.016	0.676	0.814	-0.138	-0.002
Cash Flow	-0.633	0.093	0.087	0.006	-0.004
Acquisition Expenses	-0.431	0.021	0.015	0.006	-0.003
Leverage	-0.218	0.250	0.209	0.041	-0.009
Industry Effects					
Consumer	0.020	0.262	0.112	0.150	0.003
Manufacturing	-0.001	0.247	0.372	-0.125	0.000
Healthcare	-0.011	0.093	0.134	-0.041	0.000
Other	0.080	0.122	0.074	0.048	0.004
Total Explained Component					0.018
Total Unexplained Component					-0.005

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