Meet my family: women in leadership and gender stereotypes in the media*

Lavinia Kinne† Virginia Sondergeld‡

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Abstract

Women continue to be heavily underrepresented in corporate leadership positions. An understudied contributor to this may be stereotypes around female leaders, e.g. in the media. We analyze ten thousands of newspaper articles from three major German newspapers and show that the coverage for female CEOs and board members focuses more on family and care whereas male CEOs are associated with leadership and power. With no difference in article length, this representation likely reinforces gender stereotypes. In a representative and incentivized survey experiment (N=3500), we then study whether the stereotypical representation of female CEOs affects readers' expectations and financial decisions towards the CEO's firm. Based on real CEOs and existing newspaper coverage, we vary whether a female or male CEO's family is either not mentioned, neutrally mentioned or framed in a successfully navigated trade-off with their career. Respondents expect firm stocks to perform differently for female or male CEOs, and they invest less money into stocks of a female-led firm, especially when the family of a female CEO is neutrally mentioned. Instead, there is no punishment for mentioning the (successful) trade-off between career and family. These patterns are particularly driven by female respondents and parents. Through (a large body of) free-text reasoning, we can identify family and gender as strong considerations for respondents' answers. In particular, highlighting a successful navigation of family and career increases the positive sentiment towards family and gender, which suggests that female leaders are seen as a positive role model. Male CEOs never face a penalty for having their family mentioned.

Keywords: women in management, CEOs, gender stereotypes, financial decision-making, online experiment.

JEL Classification: J16, D83, D91, G41

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†DIW Berlin, Berlin School of Economics, and University of Potsdam, lkinne[at]diw[dot]de

‡Indeed and DIW Berlin, vsondergeld[at]diw[dot]de

1 Introduction

Despite significant progress in women's labor market integration, they continue to be underrepresented in leadership roles such as top-management positions on company boards. The average share of women among executive board members of blue-chip companies across the European Union stood at 24 percent as of June 2024. The corresponding share among CEOs was merely 8 percent (Gender Equality (EIGE) - Gender Statistics Database, 2024). Germany is no exception to this: female representation in leadership positions increased over the past years, but remains far from parity. As of fall 2023, women held 18 percent of executive board positions in the 200 largest German companies (Sondergeld et al., 2024). These numbers are similar to those of the US: in the S&P 1500 companies, six percent of CEOs were women and around 20 percent in boards of directors were female (Hindlian et al., 2018).

A large body of research seeks to understand and quantify factors that contribute to the persistent gender gap in leadership positions, examining the obstacles that hinder women's advancement in their careers. These include career interruptions after childbirth (Bertrand et al., 2010; Bütikofer et al., 2018; Kleven et al., 2024), the unequal distribution of non-market labor and the resulting demand for flexibility in working hours (Goldin, 2014; Samtleben and Müller, 2022; Wiswall and Zafar, 2018), differential access to networks (Cullen and Perez-Truglia, 2023; Hampole et al., 2024; Von Essen and Smith, 2023) or labor market discrimination affecting women's career aspirations (Azmat et al., 2025). Additionally, gender stereotypes on the distribution of skills, social and occupational roles, and personality traits affect labor market decision-making, both on the labor supply and labor demand side, creating barriers for women in attaining leadership positions (Bertrand, 2020). On the labor supply side, gender stereotypes affect individual career and occupational choices, investments in education and skills (Breda et al., 2023; Porter and Serra, 2020), the distribution of work within households (Couprie et al., 2020), or behavior in the workplace (Coffman, 2014). On the labor demand side, gender stereotypes may lead to biases and double standards in hiring (Barron et al., 2025; Reuben et al., 2014) and performance evaluation and promotion (Benson et al., 2025; Bircan et al., 2025) as well as negative backlash for those who do not conform to gender stereotypes (Rudman and Phelan, 2008).

Newspapers and other media play an important role in transporting gender stereotypes in various contexts. How media consumption shapes attitudes and beliefs of individuals has been extensively researched in social and media sciences (Oppliger, 2007; Sink and Mastro, 2017) and economics (Bursztyn et al., 2023; DellaVigna and La Ferrara, 2015; Tetlock, 2015). The way newspapers and news-providing web pages frame objective facts is an important factor for readers' perception of news content, e.g. around health crises (Berger et al., 2023), green technology (Chen et al., 2022), but also more personal topics such as fertility (La Ferrara et al., 2012). Recent studies have shown differences in portrayal of women and men in public positions in the media. In particular, more family-related personal coverage and reference to gender as well as physical appearance has been found for female politicians (see Van der Pas and Aaldering (2020) for a meta analysis). Eizmendi-Iraola and Peña-Fernández (2022) also

show that newspapers frequently highlight singularity and care roles of female scientists in STEM in Spain.

In this paper, we document gender stereotypes in the media for females in corporate leadership positions and show that they have important consequences for the firms these women are leading. The first part of the paper uses several tools from natural language processing (NLP) to analyze a dataset of more than 45,000 articles from three major German newspapers between 2010 and 2022. Using regularized regressions as well as a dictionary-based approach, we find that terms related to gender, family, and social interactions predict whether an article is about a woman. Conversely, terms associated with power and competition, including failure, scandals, and adversity are predictive of articles about male company leaders. Furthermore, we screen the articles for language related to agency and communion – two fundamental content dimensions in psychology that are closely related to gender stereotypes (Hsu et al., 2021). We find evidence of agentic language - relating to stereotypically male traits such as success-orientation - being more prevalent for men, while communal language - relating to female stereotypes such as caregiving - is more associated with women.

Subsequently, we show that the stronger focus on family and care for female leaders is not based on actual shares of male and female leaders with a family or their self-perception regarding communal and agentic traits. Using the German household panel SOEP, we identify leadership positions both through the respondent's occupation as well as their self-reported managerial roles. Men in leadership positions are substantially more likely to be married than female leaders (61-69% vs 48-51%) and to have children living with them in the household (35% vs 24-28%). Exploiting a previously unused data source from the SOEP innovation sample in 2012, we show that male and female managers rate themselves as equally agentic and communal based on a series of items validated in multiple studies from psychology (Abele et al., 2008; Gebauer et al., 2013; Trapnell and Paulhus, 2012). We also show that stereotypes in coverage did not diminish with more women being present in corporate leadership positions over time. This speaks against actual distributions of family characteristics or information asymmetries of newspapers due to the low number of women in leadership driving their gender-stereotypical coverage.

In the second part of the paper, we run a randomized online experiment to assess whether the stereotypical representation of company leaders in newspapers affects readers' economic decision-making. We show respondents articles based on real newspaper coverage on a company and its CEO, hereby varying if and how the family of a male or female CEO is mentioned. The families of female and male CEOs are either not brought up at all, mentioned only neutrally, or a family-career trade-off is highlighted. As outcomes, we are interested in readers' perception of CEO competence (measured by their expected 'survival' in the firm and assumptions about employee ratings), and the assessment of firm performance on the stock market. Additionally, we ask respondents to invest an endowment of 100€ into either the firm's stock or a financial product following the evolution of the largest German stock index (DAX 40). All outcomes are incentivized following the development of the real firm and CEOs that the articles are based on, the investment is paid out for some of the participants. Free-text ques-

tions ask respondents to provide a reasoning for their answers, allowing for deeper analysis of potential mechanisms through quantitative text analysis.

We find that female and male CEOs are perceived differently, which has consequences for real investment decisions. Firms with female CEOs (compared to male CEOs) are associated with a worse stock performance in the year following their appointment than in the year before. While this difference seems to be driven by all treatment groups with a female CEO, regardless of newspaper coverage, investment decisions depend very much on the way the family is mentioned for female CEOs. More precisely, respondents invest statistically significant 6 percent (3,17€) less into the firm stock if the family of a female CEO is mentioned neutrally compared to the average of all other treatment groups (up to 4,60€ or 8.7 percent relative to the article neutrally mentioning the family for a male CEO). Strikingly, highlighting the trade-off between family and career does not follow the same investment penalty. On the contrary: the sum invested in the firm stock as opposed to the DAX ETF is as high for this trade-off group as for male CEOs with a neutral mention of their family.

The smaller investments into female CEOs with a family are driven by female respondents and parents. Female participants invest more in the baseline treatment of a male CEO without a family than male respondents. While both men and women invest less in case of the family of the female CEO being mentioned neutrally, this difference is more pronounced for female respondents. Instead, male respondents assign an investment bonus to male CEOs with a family and, to some extent, to female CEOs where the successful management of a family-career trade-off is highlighted. Female respondents, on the other hand, are also more skeptical towards male CEOs with a family mention. These effects seem to be partially driven by differences in gender norms between women and men in our sample. Parents invest up to 14 percent less into the firm with a female CEO and any representation as well as a male CEO with a family mention, with the strongest difference again observed for the treatment where the family of a female CEO is neutrally mentioned. Instead, childless participants assign a slight investment bonus to male CEOs with a family as well as female CEOs in the family-career trade-off treatment.

A more or less gender-stereotypical representation of CEOs has little impact on the perception of CEO competence as measured by beliefs about employee ratings and expected 'survival' in the firm. No statistically significant differences are observed for expected employee approval of the CEO on the platform Glassdoor. This result masks heterogeneities by gender but not by parental status. Female respondents expect significantly lower approval for a female CEO in all scenarios, in particular when the family is mentioned with a trade-off between family and career. Instead, male participants assume a more positive employee rating for male CEOs with a family and female CEOs who successfully managed a family-career trade-off. No treatment patterns are observed for expected CEO 'survival' in the firm after two and five years.

Using two free-text questions, we show that participants assign an important role to considerations around gender and family when answering the questions on incentivized outcomes. Concepts related to gender are almost exclusively mentioned in treatment groups with a female CEO, indicating that the gender of a female CEO is much more salient than for a male

CEO. The sentiment of these gender-related arguments is mostly balanced between positive and/or negative, whereas the gender has more of a positive connotations for the treatment highlighting a family-career trade-off for female CEOs. The share of respondents mentioning family-related words is associated with the family information on the CEOs and is clearly highest for the trade-off treatment of female CEOs. Surprisingly, these family-related arguments almost exclusively have a positive connotation, in particular for the trade-off treatment.

Our results speak in favor of both care stereotypes and perceived positive ability selection as mechanisms for our treatment effects. In the treatment where a family is only neutrally mentioned, respondents may rely particularly on stereotypes to make assumptions about the division of labor within a CEO's household. The more pessimistic assessment of female CEOs in this group together with the smaller likelihood to mention the family with a positive connotation may hence reflect the expected involvement in their family life. Instead, highlighting that a female CEO has successfully managed the trade-off between career and family appears to create a narrative of a positively selected leader who may be particularly able to generate positive impact on the firm and its employees. This suggests that stereotypes on care responsibilities may be especially strong in the absence of explicit mentions of success in managing them, potentially further slowing women's already limited advancement into leadership roles.

Our paper relates to three strands of the literature. First, we add to the work on gender stereotypes in large texts, and their impact on economic outcomes. Baltrunaite et al. (2022) and Eberhardt et al. (2023) analyze reference letters from the economics academic job market and show that female and male applicants are associated with different characteristics leading to consequences for their job placement. Instead, Casamonti and Zinovyeva (2024) don't find differences in the evaluations of applicants for a national qualification certifying their eligibility for professorial promotion at Italian public universities. Ash et al. (2024) use gender stereotypes in judges' authored opinions to classify the gender attitudes of judges in US courts. Through random assignment of judges, they show the impact of such 'gender slant' on judicial decision-making. Adukia et al. (2023) and Adukia and Harrison (2025) document stereotypical gender representation in children's books as well as school textbooks. We contribute to this literature by focusing on gender stereotypes of firm leaders in ubiquitous daily documents, i.e. newspapers. Additionally, we provide evidence on financial decisions such as stock investments which may have a broader impact on stock markets overall as well as perceived leader competence that in turn may hinder the progression of women into leadership positions.

We also contribute to the literature on the impact of stereotypes and narratives in the media on economic decisions. While this has been studied in other contexts, we are the first to show that stereotypical representation of women in leadership positions has important consequences on real financial decision-making. La Ferrara et al. (2012) show that more progressive gender norms in television shows can lead to a change in viewers' own fertility decisions. DellaVigna and La Ferrara (2015) and Tetlock (2015) summarize the literature regarding the impact of media on economic, social, and financial decisions, Zhuravskaya et al. (2020) review the findings around social media and political outcomes. More recently,

Bursztyn et al. (2023) turn to opinion programs, especially during the COVID-19 pandemic, as a particularly polarizing type of media coverage. Berger et al. (2023) use a similar experimental setting to ours to show that narratives around the COVID-19 pandemic have a substantial impact on expected stock market development. Caprini (2023) and Ash et al. (2021) document (gender) stereotypes in news media's visual representation, Bellet and Pocchiari (2024) classify gender stereotypes in TV advertisements.[1] Similar to our setting, Caprini (2023) shows how ideological stereotypes can shape readers' perception of the news content. Andre et al. (2023) document how different expert, investor, or general population samples in the US and Germany expect stock prices of a firm to evolve when they receive different types of news about the respective company. They mainly use hypothetical news scenarios, but also have an extension that relies on real news about the company Siemens. Carvalho (2025) documents that both financial analysts and investors react more strongly to bad news about a firm's performance when the company has a female CEO compared to a male CEO.

Lastly, we speak to the evidence on stereotypes as barriers for women reaching leadership positions.[2] Barron et al. (2025) and Reuben et al. (2014) document how stereotypes lead to biases and double standards in hiring decisions of employers. Benson et al. (2025), Bircan et al. (2025), and Hospido et al. (2022) additionally shed light on stereotypes in employee evaluations and their impact on job promotions. Hampole et al. (2024) show the importance of social networks for the advancement of female MBA students into senior management positions. Bertrand et al. (2019) document the inclusive effect of a board quota in Norway, although with limited trickle-down effects on more junior women. Similar effects can be observed for a gender quota on company boards in Italy (Maida and Weber, 2022). Instead, Beaman et al. (2009) show how more women in leadership positions in Indian village councils lead to more female representation through a reduction of gender stereotypes. On the other hand, women who do progress into leadership positions may face backlash from violating gender stereotypes according to role congruity theory (Eagly and Karau, 2002; Rudman, 1998; Rudman and Phelan, 2008). In fact, women contribute less to the idea generation in groups, in particular in gender-incongruent domains, and this hurts group performance (Coffman, 2014). Woman also promote themselves less in male-typed tasks but not in female-typed tasks (Exley and Kessler, 2022). Our paper investigates a particular channel that may hinder women from reaching top management positions: differential expectations about their competence in the firm and resulting gendered investment patterns into the firm's stock. We show that this channel is particularly shaped by media and their representation of female leaders, in particular regarding family and care stereotypes.

[1] Relatedly, Freimane (2024), Aguiar (2024), Venus (2024), Kerkhof and Reich (2023), Botelho and Gertsberg (2022), Wu (2018), and Ederer et al. (2024) document gender stereotypes on large online platforms such as YouTube, Rotten Tomatoes, Wikipedia, Spiegel Online (SPON), Yelp, and the Econ Job Market Rumors forum.

[2] In related work from social psychology and management, Ryan and Haslam (2005), Bruckmüller and Branscombe (2010), Bruckmüller et al. (2012), and Bruckmüller and Braun (2020) document that female leaders more often appear in precarious leadership positions (so-called 'glass cliff') and how the framing of metaphors such as 'glass ceiling' or 'glass cliff' can affect the perception of gender inequality.

The remainder of the paper is structured as follows. Section 2 describes the analysis of newspaper articles, including the comparison with actual distributions. Section 3 explains the experimental design, gives an overview of the sample and its descriptive statistics, and presents the results of the experiment. Section 4 concludes.

2 Uncovering Gender Stereotypes in Newspaper Articles

2.1 Data

We first analyze the newspaper coverage of company board members using more than 45,000 articles from three prominent German daily newspapers, spanning the years 2010 to 2022. The sample includes articles that mention both the company name and the names of the chairpersons of the executive or supervisory boards, or the names of any female executive board members in the respective companies.

The group of companies assessed comprises all those listed in the three largest German stock market indices (DAX-30/40, MDAX, and SDAX) during the period from 2012 to 2022. The data on companies and board members is sourced from the annual DIW Women Executives Barometer, which is the most comprehensive data collection on women's representation on executive and supervisory boards of companies in Germany (Sondergeld and Wrohlich, 2024). In addition to the number of women and men on these boards in each year, the data includes the names of the chair persons of each board as well as the names of all women on the executive board.

Table 1 provides an overview of the numbers of chairpersons of executive and supervisory boards, as well as (non-chair) women on executive boards, and the number of articles related to individuals in each of these roles. Women are significantly underrepresented on boards of German companies, particularly as chairpersons, and this is reflected in the sample. In total, there are 15 (13) women as executive (supervisory) chairs in the sample compared to 373 (260) men. These numbers result in a gender imbalance in the number of articles with 632 (360) articles mentioning women as executive (supervisory) chairs compared to 35,149 (11,860) for male executive (supervisory) chairs. There are further 2,187 articles on 111 women as executive board members in the data, resulting in a sample of 614 male and 127 female board members and 45,715 articles on men and 2,712 articles on women.[3]

2.2 Data processing

In this section, we explain how we process the raw text of the newspaper articles and transform them into a dataset that can be analyzed using quantitative text analysis methods. All articles used are written in German. We describe all preprocessing steps using English translations

[3]As heavily imbalanced data can be problematic in particular in estimating regularized regression such as LASSO (section 2.3.1), we further create a dataset taking a 10 percent random sample of articles on men for both executive and supervisory chairmen that we use for this analysis. The numbers of observations of the 10 percent subsample are shown in Table A.2.

Table 1: Numbers of observations of board members and articles

	Executive chairs	Supervisory chairs	Executive members	Total
Men	373	260		614
Women	15	13	111	127
Total - persons	388	273	111	741
Articles men	35,149	11,860		45,715
Articles women	632	360	2,187	2,712
Total - articles	35,781	12,220	2,187	48,427

Notes: Numbers of observations of board members and newspaper articles in the dataset by position and gender. The total numbers of observations (last column) do not match the sum of observations for the separate positions as some persons appear in several groups, e.g. first as executive chair and later as supervisory chair of the same company or as executive board member and later executive chair.

of the texts, but provide examples from the original German texts in the appendix wherever useful.

2.2.1 Selecting relevant sentences

The focus of the analysis is on the newspaper coverage of company board members. Therefore, for each article, we restrict the analysis to sentences that either mention a board member's name or refer to their position (executive or supervisory board chair or executive board member) or a pronoun in the grammatical form that corresponds to the person's gender. Table 2 presents the different search terms used to pick the relevant sentences for the different combinations of board positions and gender.

Table 2: Translation of search terms to select relevant sentences from each article

	Man	**Woman**
Executive board chair	first and last names, *he*, *him*, *his*, *chair of the (executive) board* (male), *CEO*, *chief executive officer*, *boss* (male), *speaker of the board* (male), *manager* (male)	first and last names, *she*, *her*, *chair of the (executive) board* (female), *CEO*, *chief executive officer*, *boss* (female), *speaker of the board* (female), *manager* (female)
Supervisory board chair	first and last names, *he*, *him*, *his*, *chair of the supervisory board* (male), *supervisory board chair* (male), *boss* (male), *chief supervisor* (male), *speaker of the supervisory board* (male)	first and last names, *she*, *her*, *chair of the supervisory board* (female), *supervisory board chair* (female), *boss* (female), *chief supervisor* (female), *speaker of the supervisory board* (female)
Executive board member		first and last names, *she*, *her*, *member of the (executive) board*, *board member*, *manager* (female)

Notes: Lists of search terms that are used to select the relevant sentences that refer to a certain board member in an article by position and gender. The lists are translated to English, the original search terms in German can be found in Table A.3 in the appendix. An example of the selection of relevant sentences from an article is provided in Figure A.1.

The selection of relevant sentences using this procedure through search terms is not entirely accurate in picking only sentences that relate to the respective board member. For example, by searching for the pronoun *he*, any sentence referring to a man using that pronoun such as a sentence about a different board member than the one at hand or even some company-external male person may be picked from the text. Further, in German also objects have a grammatical gender: the word *der Löffel* (*spoon*) is grammatically male and is referred to using the pronoun *he*, while *die Gabel* (*fork*) is grammatically female and is referred to as *she*. Thus, a sentence where the pronoun *he* refers to an object with the German grammatical gender male is falsely selected when searching through articles on male board members. Similarly searching for the word *boss* (in German *chef* indicating a male boss or *chefin* indicating a female boss) could relate to a board member of a different company. All of these cases would imply false positive selection, i.e. sentences would be picked that actually should not be included in the dataset. However, excluding the terms *he* or *boss* from the list of search terms would result in a significant number of sentences describing the respective board member being missed, thereby leading to false-negative selection errors. Since the word *boss* picks sentences only for bosses of the respectively correct gender due to the German gendered forms *chef* vs. *chefin* and the word *he* would pick mainly sentences about male individuals, such falsely positively selected sentences are unlikely to threaten the findings on gender differences in newspaper coverage of company board members as they would still align with the gender of the respective board member.

Through the selection of relevant sentences by person, an article that mentions more than one board member will at this point appear several times in the dataset, however, with a different set of relevant sentences referring to the respective person. The data is thus unique at the article-person level.

2.2.2 Text preprocessing

We follow standard procedures to preprocess the text of each article. For most preprocessing steps, we make use of tools available in the German-language pipeline package of the spaCy library in Python.[4]

First, we remove punctuation, special characters, numbers and capitalization, and divide the text into individual words (tokenization). All inflected words are then reduced to their grammatical root (lemmatization). This includes that nouns are reduced to their singular nominative case and verbs are reduced to their infinitive form.[5] we then remove all German-language stop words, which are sets of very commonly used words that typically carry little

[4]See `https://spacy.io/` (Last accessed: 17 November 2024).

[5]To reduce terms to a common root, lemmatization is relatively more time- and computing power-consuming compared to its alternative stemming, which simply cuts off prefixes and suffixes from a given term. However, the German language has a rich inflectional system with words changing their form based on grammatical features such as case, gender, number, and tense. Therefore, lemmatization leads to substantially more accurate results as it considers the context and grammatical structure of the sentence to determine the grammatical root of a term.

meaningful information.[6] Additionally, we remove company and organization names, person names, cities, countries and other geographical locations, as well as dates and times.

In German, most occupations and many words used to refer to a man or woman in a certain position are gendered (such as *Vorstand* for a male and *Vorständin* for a female executive board member). We merge all such words into a common form for all genders. For example, *Vorstand* and *Vorständin* would be merged into the common form *Vorständ_in*. This step is important for the empirical analyses to prevent that these terms are associated with men or women solely because they capture the gender of the person referred to formally but have the same meaning otherwise.

For illustration, Figure A.2 in the appendix shows an example of a raw text from an article and the same text after all preprocessing steps in German and an English translation. The preprocessed text is shorter than the original text due to the removal of stop words and other terms that do not carry any relevance related to gendered language as described above.

The set of articles is then reshaped into its term frequency-inverse document frequency (tf-idf) representation. The tf-idf representation is a numerical vector-form representation of a set of texts that captures how important each word is in a specific text compared to its importance in the entire corpus. Each text is represented as a vector of the size of the total number of words in the corpus. Each element of the vector contains the tf-idf value of a word, which divides how often a word appears in the respective text (the term frequency) by a measure of its frequency in all other texts of the corpus (the document frequency). The tf-idf representation is commonly used in NLP for tasks such as comparing texts through the distance between their tf-idf vectors or extracting topics from texts.

To describe the transformation of the set of articles into its tf-idf representation, we closely follow the notation of Eberhardt et al. (2023) in their analysis of gender differences in reference letters for female and male job market candidates in economics. As is standard practice in NLP, we refer to each article (reduced to the relevant sentences as described in section 2.2.1) as a document d, $d \in \{1, ..., D\}$. D denotes the total number of documents in the corpus. A document d has a length of N_d words. Each word is denoted as $w_i(d)$, $i \in \{1, ..., N_d\}$. Each word $w_i(d)$ is part of the set of terms $\{1, ..., T\}$, which contains all words in the corpus after dropping terms that are very rare or very common.[7] T is the total number of different terms in the corpus. For each term t and document d, the tf-idf is calculated as:

$$tfidf(t, d) = tf(t, d) \times idf(t) \tag{1}$$

The tf-idf consists of the product of the term frequency and the inverse document frequency.

[6] Stop words contain, for example, articles like *a* and *the*, common and auxiliary verbs like *are* and *have*, or common conjuctions such as *and* and *or*. We combine the collections of German stopwords from Python's advertools (see `https://advertools.readthedocs.io/en/master/advertools.stopwords.html`, last accessed: 17 November 2024) and NLTK (see `https://www.nltk.org/search.html?q=stopwords`, last accessed: 17 November 2024) libraries.

[7] As is standard practice, we drop all words that appear in less than 1 percent of documents or in more than 70 percent of documents.

The term frequency $tf(t,d)$ is the number of occurrences of term t in document d:

$$tf(t,d) = \sum_{i}^{N_d} 1(w_i = t) \tag{2}$$

Thus, the term frequency $tf(t,d)$ indicates how important a term is in a document.

The inverse document frequency $idf(t)$ is the logarithmically scaled inverse fraction of the document frequency $df(t)$ of term t:

$$idf(t) = \log \frac{1+D}{1+df(t)}, \tag{3}$$

where document frequency $df(t)$ is the number of documents that contain the term:

$$df(t) = \sum_{d} 1(tf(t,d) > 0) \tag{4}$$

Thus, the inverse document frequency $idf(t)$ is high if a term appears only in a low share of documents in the corpus, i.e. indicates how unique a term is across all documents. In this way the tf-idf as the product of the term frequency and the inverse document frequency reflects the importance of a term in a document relative to the occurence of that term in the entire corpus.

Based on the tf-idf, we reshape the text data into a $D \times T$ matrix. Each row represents a document d, each column a term t and each cell contains the $tfidf(t,d)$ of a term t in the document d. This tf-idf matrix representation of the texts is then merged back to all meta data of the texts such as name, board position, company and gender of the person referred to as well as newspaper, title and date of the respective articles.[8]

2.3 Gender differences and stereotypes in newspaper coverage of company board members

Gender differences and stereotypes in newspaper coverage of company board members are analyzed borrowing different tools from NLP. First, we explore gendered patterns emerging in the data through regularized regression, which allows me to select terms that are the best predictors of the gender of a board member referred to in an article (section 2.3.1). Second, we more explicitly assess gendered language related to gender stereotypes by looking at differences in career- and family-related language (section 2.3.1) as well as in agentic and communal language (section 2.3.1) using respective dictionaries in both tf-idf- and word embeddings-based approaches.

[8] Figure A.3 in the appendix shows an excerpt of the tf-idf-transformed data.

2.3.1 Detecting gender differences in prevalent terms using regularized regression

As an exploratory analysis without any priors on gender differences and stereotypes, we assess which terms in the newspaper coverage of board members are predictive of an article to be about a female versus a male board member using the tf-idf matrix representation of the corpus in regularized regressions.

The tf-idf matrix possesses more columns than rows as the number of terms in the corpus exceeds the number of documents ($T > D$). Further, the matrix is sparse, meaning that most of its elements are zero (see Figure A.3). Given this high-dimensional data setting, applying conventional linear regression to determine which terms most effectively explain a target variable can be problematic. Conventional linear regression attempts to find the best-fitting line by minimizing the sum of squared residuals. However, when the number of predictors (terms) is larger than the number of observations (documents) and the predictors contain many zeros, the model can become overfitted and unreliable. To address this, one can use the absolute shrinkage and selection operator (LASSO) as a regularization technique. The LASSO estimator introduces a penalty term based on the absolute values of the coefficients ('L1' penalty term). In this way, it encourages sparsity in the model by shrinking some coefficients of less important predictors to exactly zero and keeping only those with the highest predictive power in the model. Using the tf-idf representation of the corpus, LASSO solves the problem:

$$\hat{\beta} = argmin_{\beta}\{\frac{1}{2D}\sum_{d=1}^{D}(Woman_d - \mathbf{x'_d}\beta)^2 + \lambda\sum_{j=1}^{p}|\beta_j|\} \tag{5}$$

$Woman_d$ is a dummy variable denoting whether the board member referred to in document d is a woman. x_d is the $1 \times T$ row vector of document d in the tf-idf matrix. λ is a tuning parameter that scales the L1 penalty, determining the size of the model, i.e. how many predictors should be kept in the model and how many should be shrunk to zero. The optimal λ is chosen through k-fold cross-validation to maximize predictive power of the model.[9]

We estimate the LASSO regression separately for articles referring to supervisory or executive board members.[10] Estimating LASSO in a highly imbalanced sample in terms of the variable to be predicted, i.e. having many more articles on men than on women as board members, is problematic as LASSO minimizes the mean squared error over the entire sample.

[9]For k-fold cross-validation the dataset is divided into k subsets. The LASSO model is then repeatedly trained on $k-1$ subsets and validated on the remaining one, systematically testing different values for λ. The lambda that maximizes predictive power of the model as measured by minimizing the average mean-squared prediction error across all k-folds is then chosen to estimate the final model.

[10]The articles on women executive board members are not included in the LASSO regression since the dataset does not contain articles on male executive board members. If articles on female executives were included, all terms related to their board positions (e.g., chief financial officer or chief of staff) would be listed as predictors of the gender being female. However, this would be a purely mechanical effect, as there would not be any articles on male board members in such positions in the dataset and accordingly such terms would not be mentioned in association with men.

With imbalanced data this will lead to prioritizing terms that are predictive for the majority class, i.e. articles on men, and the model may miss important terms that are predictive of the minority class, i.e. articles on women. For this reason, we use a random sample of 10 percent articles on men to create a more balanced dataset (see Table A.2 for the number of observations).

Figure 1 displays the English translations of all terms selected by the LASSO estimator to have predictive power for the gender of the person referred to in the articles separately for male and female supervisory and executive board chairs. The size of the font is scaled by the β-coefficient sizes indicating terms with higher or lower predictive power.

Several observations appear from Figure 1. First, terms that relate to gender (such as *woman*, *female*, and *first_ woman*) are more prevalent in articles on women. Further, terms that are related to family (such as *mother*, *child*, *heir/heiress*, and *daughter*) are associated more often with women. The only exception here is the word *patriarch*, a male head of a family, which is more prevalent for men and often used in the context of family businesses. Further, for women more terms capturing social interaction and involvement between individuals or groups are mentioned (*partner*, *to accompany*, *to share*, *support*, *to praise s.o.*, *together*). An exception here is the word *friend* that is more often used for men. Notably, however, for men the word *friend* is often negated (such as *has few friends at ...* or *will not get him new friends*) or used in ways not related to human interactions (such as *friend of China* or *friend of ... technology*).

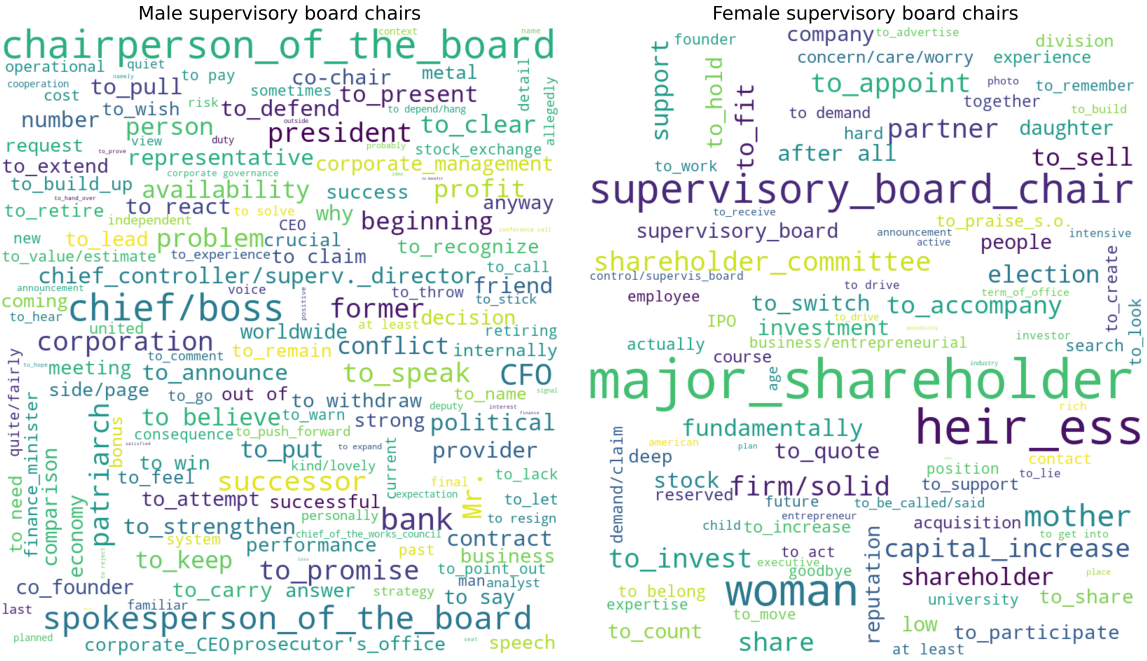
In contrast, terms related to power and competition (such as *boss*[11], *to win*, *profit/victory*, *strategy*, *game*, *to beat*, *to defend*) are predictive of an article being about a male board member. One exception here is the term *to fight*, which is more prevalent in articles on women. This term is however often used in relation to the abovementioned topics gender or and women's careers (such as *fight for equal opportunity*, *has always been fighting for what she wants to achieve*). Further terms that are commonly considered negative and associated with failure, adversity and scandals (such as *to cancel*, *conflict*, *to criticize*, *criticism*, *loss*, *to withdraw*, *scandal*, and *pressure*) are mentioned more often for male board members.

The terms picked by LASSO provide an idea of topics and concepts associated with women and men as board members without imposing any priors on differences between male and female board members or stereotypes. Notably, the terms predictive of articles about women already suggest that their gender and gender stereotypes — such as the association of women with family, caregiving, and social orientation and men with power and competition — may be important. In the next sections, we will take a more explicit look at some of these gender stereotypes by examining language related to career and family, as well as the concepts of agency and communion, which are central to gender stereotypes in social psychology.

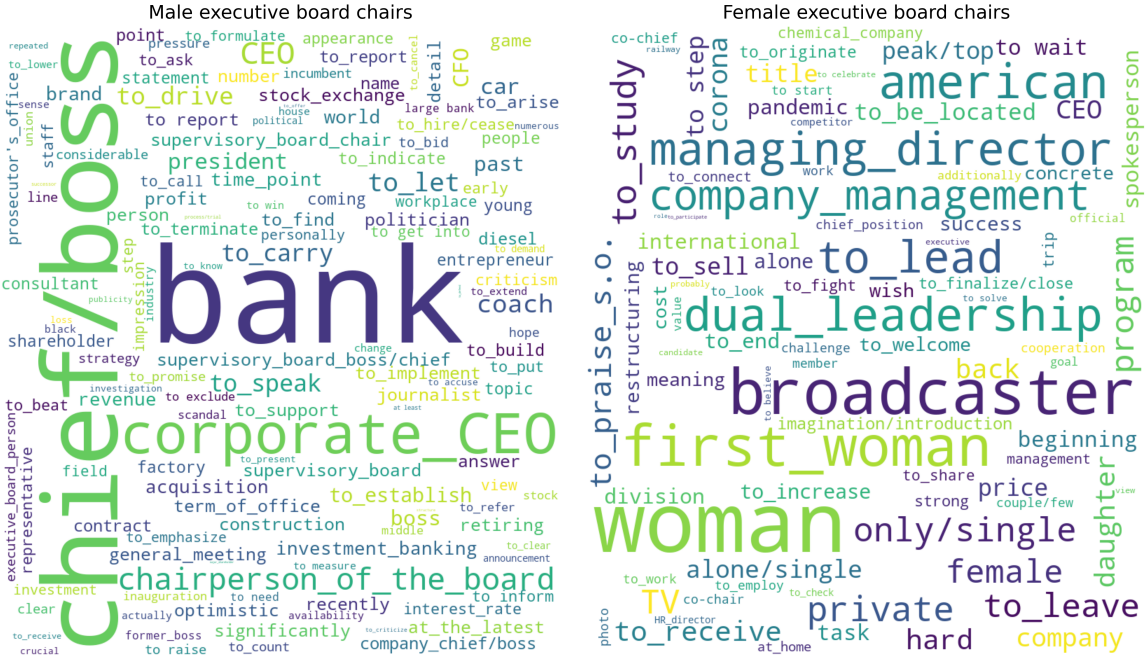
[11]The word referred to here is the German word *boss/bossin*. The German word *chef/chefin* is translated to English as *boss* also. However, *boss/bossin* is more informal than *chef/chefin* and often carries a stronger connotation of personal power and authority.

Figure 1: Non-zero coefficients from LASSO regression of gender on tf-idf matrix

(a) Supervisory board chairs



(b) Executive board chairs



Notes: English translation of terms with non-zero coeffiecients from LASSO regression of the gender of a person referred to in an article on the tf-idf matrix using a random sample of 10 percent of articles on men and all articles on women. The font of the terms is scaled by relative size of coefficients.

Gender differences in career vs. family language Traditional gender roles associate men with careers, expecting them to be the primary breadwinners of a household, and associate women with family, expecting them to be primary caregivers and homemakers. we assess the presence of language related to these gender stereotypes in the newspaper coverage of company board members in two dictionary-based approaches employing the tf-idf representation as well as word embeddings. We employ the Linguistic Inquiry and Word Count (LIWC) dictionaries, which are human-validated and commonly used in linguistics, computer science, and NLP to measure the use of concepts and topics in texts.[12] Following Ash et al. (2024) in their analysis of gender-stereotyped language in judical opinions, we use the dictionaries for *family* and *work* to measure family- and career-related language, respectively.

Using the tf-idf representation, we measure the importance of career and family words in a document as the sum of the tf-idf of terms belonging to each the career and family dimensions. we then compare the average of this sum for documents referring to women compared to men as board members. Table 3 shows that career-related terms have a higher average sum of the tf-idf in articles on men (0.981 for women vs. 1.079 for men in the sample of all articles on supervisory, executive chairs, and all women as executive board members, subtable (a) in Table 3) while family-related terms have higher tf-idf in articles on women board members (0.121 for women vs. 0.041 for men). Importantly, the relative gender difference for family terms (96 percent) is much larger than for career terms (-10 percent). A reason for this is that overall the investigated articles contain many more career-related terms than family terms as the articles are centered around topics in business and management. Exactly for the reason that these articles usually do not deal with family-related topics, the gender difference for these terms is particularly striking. The gender gap in family and career language persist in similar magnitudes also in the separate samples of supervisory or executive board chairs (subtables (b) and (c)).

The advantage of the tf-idf-based approach is that it is easy to implement, computationally efficient, and the results are readily interpretable. However, word-count based approaches like the tf-idf disregard the semantic relationships between terms. This means that the tf-idf treats each word as an independent entity without considering its meaning or the context in which it appears. Consequently, the tf-idf cannot capture the nuanced relationships between words that go beyond simple co-occurrence or frequency patterns. A technique from NLP that preserves semantic relationships between words are word embeddings. Word embeddings, such as those introduced by Mikolov et al. (2013), represent each term as a vector in a continuous space. These vectors are of a predetermined dimension and are generated based on the context in which words are used within a given corpus. The core idea is that words appearing in similar contexts will have similar vector representations, and the proximity and relative position of these vectors in the vector space capture their semantic similarity. For example, words that are used frequently in similar contexts, like *king* and *queen*, will have vectors that are close together in the vector space. This closeness indicates that these words share a semantic

[12] See Meier et al. (2018) for a description of the German version of LIWC.

Table 3: Average sum of the $tfidf(t,d)$ of career and family terms in articles by gender

(a) Supervisory and executive board chairs and executive board women

	Men	Women	Difference	Difference in percent
Career	1.079	0.981	-0.0972***	-9.9
Family	0.0411	0.121	0.0803***	95.8
Observations	48,452			

(b) Supervisory board chairs

	Men	Women	Difference	Difference in percent
Career	1.037	0.938	-0.0993***	-10.6
Family	0.0556	0.111	0.0555***	94.1
Observations	12,244			

(c) Executive board chairs

	Men	Women	Difference	Difference in percent
Career	1.081	0.999	-0.0818***	-8.2
Family	0.0377	0.141	0.103***	96.2
Observations	35,773			

Notes: Average sum of the $tfidf(t,d)$ of career and family terms in articles referring to male or female board members in the entire dataset and subsamples of supervisory and executive board chairs.

relationship, such as both being royalty terms. Furthermore, the distance and relative position between different word pairs is similar if their semantic relationships to other word pairs are determined by the same underlying concept. For example, the vectors $\overrightarrow{man}$ and $\overrightarrow{woman}$ would hold a similar relative position towards each other as the words $\overrightarrow{king}$ and $\overrightarrow{queen}$ or the words $\overrightarrow{chairman}$ and $\overrightarrow{chairwoman}$ since each of these word pairs' relative position is determined by the underlying concept gender.

We use word embeddings as a second approach to measure the association of women with family and men with career in the newspaper coverage of company board members. We train word embeddings using the Word2vec algorithm separately for articles on supervisory and executive board chairs and for all articles together including those on women executive board members.

We then follow Ash et al. (2024) in measuring the association of men with career and women with family as the cosine similarity of the two vectors defining the gender and the career/family dimension in the corpus of newspaper articles. The gender dimension is identified as the difference between the average vector representation of the ten[13] most common terms

[13]We follow Ash et al. (2024) here, but as a robustness check repeat the exercise also using the five or 15 most common terms (Table A.4). Further, we use the Word2vec default vector size of 100 but also repeat the analysis with a vector size of 300 that is used in this paper as a robustness check (Table A.5).

in the LIWC male and the female dictionaries:

$$\overrightarrow{mf} = (\overrightarrow{male} - \overrightarrow{female}) = \frac{\sum_n \overrightarrow{maleword}_n}{N_m} - \frac{\sum_n \overrightarrow{femaleword}_n}{N_f} \tag{6}$$

Similarly, the career/family dimension is defined as $\overrightarrow{cf} = (\overrightarrow{career} - \overrightarrow{family})$ based on the ten most common terms of the LIWC dictionaries. To measure the association of men with career and women with family, we investigate whether the male and female vectors have a similar relative position to each other as the career and family vectors by calculating the cosine similarity of the vectors $(\overrightarrow{male} - \overrightarrow{female})$ and $(\overrightarrow{career} - \overrightarrow{family})$:

$$\text{sim}(\overrightarrow{mf}, \overrightarrow{cf}) = \frac{\overrightarrow{mf} \cdot \overrightarrow{cf}}{\|\overrightarrow{mf}\| \cdot \|\overrightarrow{cf}\|} \tag{7}$$

where $\text{sim}(\overrightarrow{mf}, \overrightarrow{cf})$ varies between -1 and 1: the closer it is to 1 the stronger men are associated with careers and women with family in the corpus of articles. A value of 0 indicates no association and negative values indicate that men are associated with family and women are associated with careers.

Table 4 displays the cosine similarities of the gender and career/family dimensions $\text{sim}(\overrightarrow{mf})$ from word embeddings trained on the corpi of articles on supervisory board chairs, executive board chairs and all supervisory and executive board chairs as well as the entire dataset. All of the cosine similarities are positive varying between 0.11 and 0.37 indicating that male terms are associated more with career terms and female terms are associated more with family terms. Compared to the distribution of cosine similarities found in Ash et al. (2024) for different judges, the found association is moderate (in the lower third of the distribution).

Table 4: Cosine similarity of gender and career/family dimensions

Supervisory chairs	0.37
Executive chairs	0.12
Executive and supervisory chairs and executive board women	0.11

Notes: Cosine similarities of the vectors capturing the gender dimension ($\overrightarrow{mf}$) and the career/family dimension ($\overrightarrow{cf}$) using word embeddings trained on articles referring to different groups of board members. A positive cosine similarity indicates that an association of male terms with career terms and of female terms with family terms.

Gender differences in agentic vs. communal language Psychology has identified agency and communion ('The Big Two') as the two broadest dimensions underlying the content of self and social perception (Abele and Wojciszke, 2018; Martin and Slepian, 2017). While the dimension agency refers to goal-pursuit and achievement orientation, i.e. the existence of a person as an individual striving to be independent, the dimension communion

refers to a person's social- and service-orientation, i.e. the strive for building relationships, and emphasizes the existence of an individual as part of a larger organism or community. The two dimensions are also sometimes labelled as 'getting ahead' vs. 'getting along' (Hogan, 1982). The Big Two were originally developed to capture masculine traits and feminine traits and thus are closely related to gender stereotypes, where agency maps onto the stereotypical male role and communion maps onto the stereotypical female role (Hsu et al., 2021). However, agentic traits are also those that are seen as valuable or even required to succeed in a leadership position. Therefore the stereotypical association of men with agency and women with communion creates gendered expectations on the distribution of skills required for success in managerial roles (Lawson et al., 2022).

Weanalyze whether gender stereotypes on agency and communion are transported in newspaper coverage of company board members. For this, we employ the dictionary developed by Pietraszkiewicz et al. (2019) measuring the manifestation of agency and communion in language. Agency in the dictionary is captured by terms such as *ambition**, *earn**, *goal**, *importan**, or *independ**, while communal language includes terms such as *accept**, *care**, *contribut**, *human**, or *request**.[14] Analogously as for career and family, we calculate the average sum of the tf-idf for both agentic and communal terms in articles referring to women compared to men as board members.

Table 5 shows that in the sample of all articles on supervisory, executive chairs and all women as executive board members on average documents referring to women as board members contain less agentic language than those on men (0.112 for women compared to 0.135 for men), while documents on women contain more communal language (0.133 for women compared to 0.111 for men). This finding also holds for the separate subsamples of supervisory and executive board chairs. Considering the size of the gender difference, the gap in agentic language of -21.3 percent is similar to the one found for job advertisements of male- and female-dominated occupations in Pietraszkiewicz et al., 2019, the difference in communal language of 15.9 percent is comparably smaller.[15]

Analogously to the career/family dimension, we also use the trained word embeddings to compute the cosine similarity of the two vectors defining the gender and the agency/communion dimension. Table 6 shows that the cosine similarity is positive varying between 0.12 and 0.26 for all three corpi indicating that male terms are associated with agency while female terms are associated with communion.

[14]Since the newspaper articles in the dataset are in German, we translate all terms in the dictionary to German using ChatGPT.

[15]As Pietraszkiewicz et al. (2019) considers the share of agentic vs. communal terms instead of the tf-idf, we calculate the gender difference also in terms of this normalized word count measure as a robustness check (Table A.6) finding the results to persist but again to be relatively small compared to the job advertisements analyzed in this paper.

Table 5: Average sum of the $tfidf(t, d)$ of agentic and communal terms in articles by gender

(a) Supervisory and executive board chairs and executive board women

	Men	Women	Difference	Difference in percent
Agency	0.135	0.112	-0.0238***	-21.3
Communion	0.111	0.133	0.0211***	15.9
Observations	48,452			

(b) Supervisory board chairs

	Men	Women	Difference	Difference in percent
Agency	0.122	0.0883	-0.0340***	-38.6
Communion	0.0971	0.133	0.0358***	27.0
Observations	12,245			

(c) Executive board chairs

	Men	Women	Difference	Difference in percent
Agency	0.136	0.113	-0.0236**	-20.9
Communion	0.0805	0.0974	0.0169**	17.3
Observations	35,880			

Notes: Average sum of the $tfidf(t, d)$ of agentic and communal terms in articles referring to male or female board members in the entire dataset and subsamples of supervisory and executive board chairs.

Table 6: Cosine similarity of gender and agency/communion dimensions

Supervisory chairs	0.26
Executive chairs	0.12
Executive and supervisory chairs and executive board women	0.12

Notes: Cosine similarities of the vectors capturing the gender dimension ($\overrightarrow{mf}$) and the agency/communion dimension ($\overrightarrow{ac}$) using word embeddings trained on articles referring to different groups of board members. A positive cosine similarity indicates that an association of male terms with agentic terms and of female terms with communal terms.

2.4 Relation to stereotypes as a form of statistical discrimination

The analysis of newspaper coverage of company board members in section 2.3 revealed gender differences consistent with gender stereotypes. Specifically, women are more associated with family and communion, while men are more associated with careers and agency.

In economics, gender stereotypes have traditionally been viewed as a form of statistical discrimination (Arrow, 1973; Phelps, 1972). In models of statistical discrimination, differential treatment of individuals occurs when, under asymmetric information about an individual's traits, these are inferred using membership in a social group and beliefs about the aggregate distribution of traits within that group (Bertrand, 2020). These group-level beliefs are typi-

cally considered accurate in the sense that they are based on the actual aggregate distribution of traits within the social group. Thus, the view of gender stereotypes as a form of statistical discrimination implies that they are rooted in genuine aggregate differences between men and women. For example, the association of women with family and men with careers, while potentially inaccurate for any given individual, could be rationalized within this framework if, on average, women tend to assume more family responsibilities, whereas men more frequently serve as primary earners. In contrast, social psychology[16] emphasizes that stereotypes are cognitive schemas facilitating information processing, but that they may be biased in the sense that they may not accurately reflect true aggregate distributions. Stereotypes could be rooted in history or stem from individuals overgeneralizing their personal experiences with a social group, rather than relying on true aggregate distributions of the group's characteristics. Furthermore, it is stressed that relatively small between-group differences may be exaggerated in cognitive processing, while larger within-group variation is discounted.[17]

This raises the question whether the gender-stereotyped portrayal of board members in newspaper coverage is based on accurate beliefs about aggregate distributions and thus can be explained as a form of statistical discrimination or whether it reflects a bias. We assess two ways the found gender differences could be in line with statistical discrimination: First, due to the low number of women as company board members, there may be an information asymmetry about the characteristics of female managers. Consequently, beliefs about female board members' characteristics and resulting gender differences in newspaper coverage may reflect distributions of characteristics of men and women in the general population, but not necessarily those of the subgroup of managers. If the gender-stereotyped coverage stems from statistical discrimination in this way, one would expect stereotypical coverage to diminish over time as more women attain board roles and the information asymmetry about their characteristics decreases. In section 2.4.1, we analyze changes in language over time to investigate this possibility. Second, gender differences in newspaper coverage may accurately reflect actual distributions of male and female managers' characteristics. To evaluate this, one would like to know: are there differences in family status between men and women on boards that explain the stronger association of family-related language with female board members? And are women on boards genuinely less agentic and more communal than their male colleagues? While such data is not available for German board members specifically, the representative German Socio-Economic Panel (SOEP) provides relevant information on individuals in leadership roles. In section 2.4.2, we compare the differences in newspaper coverage to actual distributions of family-related variables and previously unanalyzed psychological traits from the SOEP.

[16] See Ellemers (2017) for a review of this literature.

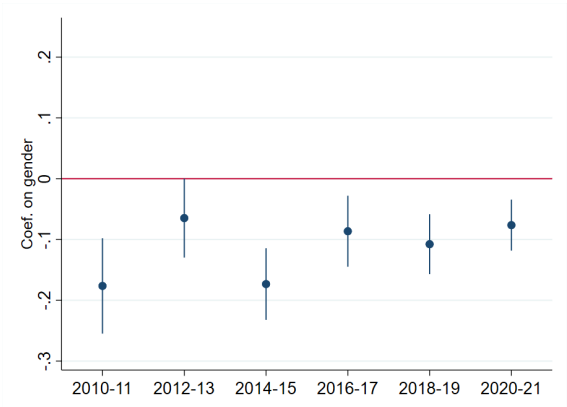
[17] See literature on the *gender similarities hypothesis* (Hyde, 2005; Hyde, 2014; Zell et al., 2015).

2.4.1 Changes in language over time

To examine whether gender stereotypes in newspaper coverage might result from statistical discrimination due to information asymmetry about female board members' characteristics, we analyze changes in language over time. The model would predict that gender stereotypes in coverage should diminish as the number of women on company boards has steadily increased over the past decade, reducing information asymmetry about their characteristics. Specifically, we investigate how gender differences in career- and family-related language, as well as in agentic and communal language, have evolved over time.

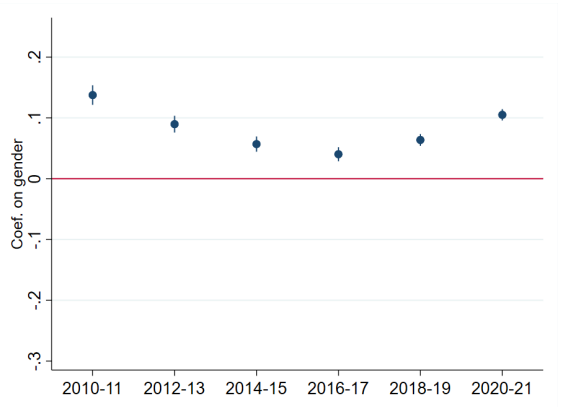
We compute the gender difference in the average sum of the tf-idf of career and family terms as well as agentic and communal terms for six two-year windows from 2010-11 to 2020-21 for the sample of articles on all supervisory and executive board chairs as well as executive board women. Figure 2 shows a slight decrease in the gap in career language since 2014-15 but no clear trend when considering the entire observation period, for family terms the positive gender difference (i.e. more family-related terms for women) decreased between 2010-11 and 2016-17 but since then has increased again (Figure 3). While for agentic language (Figure 4) the gender gap persists but is slightly smaller in the second half of the observed time period, for communion no clear trend is observed. Overall, there is no evident decrease in gender differences in stereotype-related language over time.

Figure 2: Gender difference in career terms over time



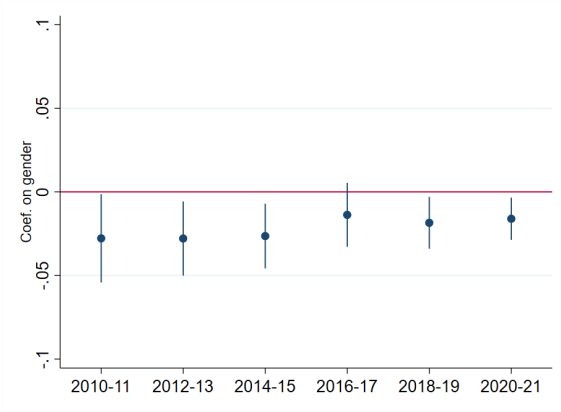
Notes: Difference in the average sum of the $tfidf(d,t)$ of career terms in articles referring to male or female board members over time in two-year windows from 2010 to 2021. A positive coefficient indicates a higher average sum of the $tfidf(d,t)$ for articles on women.

Figure 3: Gender difference in family terms over time



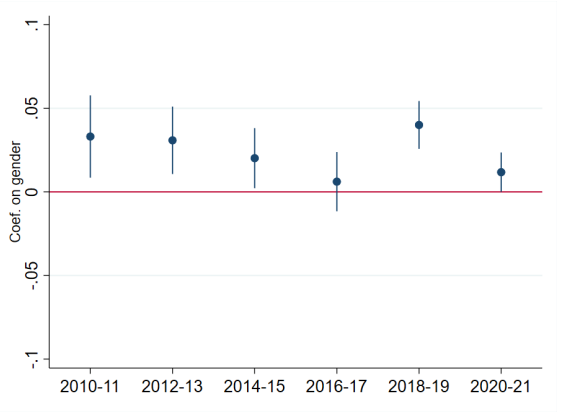
Notes: Difference in the average sum of the $tfidf(d,t)$ of family terms in articles referring to male or female board members over time in two-year windows from 2010 to 2021. A positive coefficient indicates a higher average sum of the $tfidf(d,t)$ for articles on women.

Figure 4: Gender difference in agentic terms over time



Notes: Difference in the average sum of the $tfidf(d,t)$ of agentic terms in articles referring to male or female board members over time in two-year windows from 2010 to 2021. A positive coefficient indicates a higher average sum of the $tfidf(d,t)$ for articles on women.

Figure 5: Gender difference in communal terms over time



Notes: Difference in the average sum of the $tfidf(d,t)$ of communal terms in articles referring to male or female board members over time in two-year windows from 2010 to 2021. A positive coefficient indicates a higher average sum of the $tfidf(d,t)$ for articles on women.

2.4.2 Comparison to actual distributions

To assess whether the found gender differences in newspaper coverage reflect actual distributions of characteristics of male and female managers correctly, we investigate the distribution of several variables that are related to family status as well as measuring agency and communion among men and women in the general population versus subsample of individuals in leadership positions. For family status, we use the longitudinal data of the German Socio-Economic Panel (SOEP), which is a representative yearly survey of German households and provides a broad set of demographic and employment variables (Goebel et al., 2019). For agency and communion, we use psychometric data from the SOEP Innovation Sample (SOEP-IS), which so far has not been analyzed.[18]

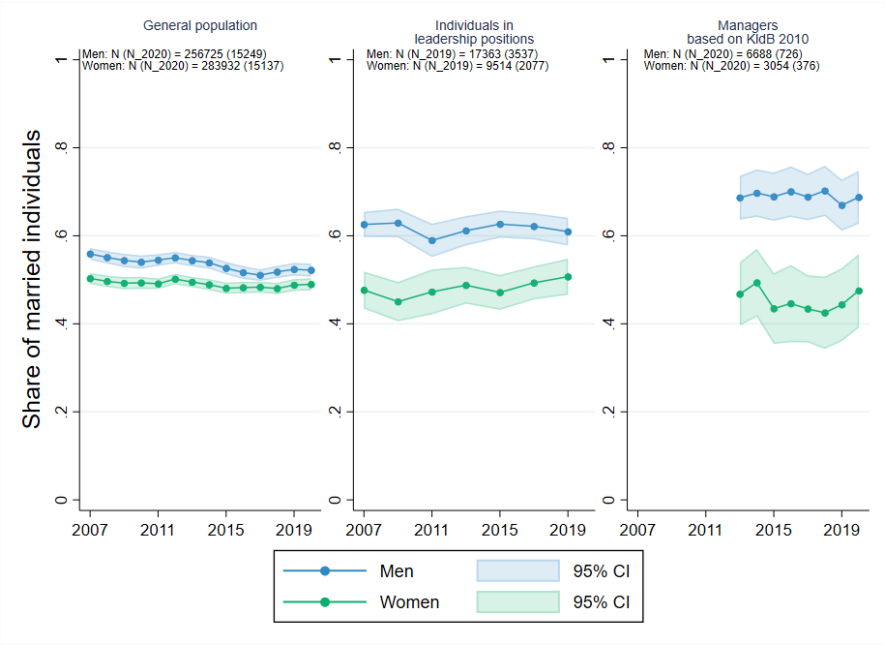
We calculate the gender differences in the respective variables both for the whole sample of the SOEP as well as for subsamples using different definitions of corporate leadership roles similar to board positions. In this way, we aim to investigate gender differences in the population compared to the (self-)selected group of individuals in managerial roles. As described above, a stereotype may be rooted in a belief about gender differences in a characteristics that may be correct on average for the entire population but may be incorrect on average for gender differences between men and women conditional on them being part of the subgroup of individuals in managerial roles. A first definition of individuals in managerial roles is based on a question from the SOEP questionnaire asking whether the individual in their job is in a leadership position. A second definition is based on the on the classification of the individ-

[18]The SOEP Innovation Sample is a representative dataset used for short-term experiments and innovative survey modules (SOEP Innovation Sample (SOEP-IS), data from 1998-2021. 2023. DOI: `10.5684/soep.is.2021`). The data on the module 'The Big Two - Agency and Communion' was collected once in the year 2012.

ual's occupation according to the German Classification of Occupations (KldB 2010)[19] or the International Standard Classification of Occupations (ISCO-88)[20].

Family status To assess the family status of men and women in the sample, we consider their marital status as well as the presence of children in the household. Figure 6 shows that in the entire SOEP sample, women are slightly less often married than men (49 vs. 52 percent in 2020). This difference, however, is substantially larger for both definitions of managers: a share of 48 to 51 percent of women in leadership positions in the sample are married in 2019/20, while a share of 61 to 69 percent of men in these groups are married. All differences are statistically significant ($p < 0.05$).

Figure 6: Share of married men and women in general population and samples of managers



Notes: Share of married men and women by year in the whole sample of the German SOEP and in subsamples of managers identified by the SOEP survey question whether the individual in their job is in a leadership position or using the 4th digit of the KldB 2010 Classification of Occupations.

Similarly, while on average slightly more women have children living in their household in the general population (23 percent for men and 25 percent for women in 2020, difference not statistically significant), a higher share of male managers (35 percent) has children living in their households than of female managers (24 to 28 percent) in 2019/20 (Figure 7) Also conditional on having children, male managers on average have slightly more - however not in all years statistically significantly more - children (Figure A.4).

[19] Managers in the KldB 2010 can be identified using the 4th digit of the occupation.

[20] Managers in the ISCO classification can be identified using the 1st digit of the occupation. The newer KldB 2010 is only included in the SOEP data from 2013 onwards. Therefore, we rely on the older ISCO-88 classification for the 2012 SOEP-IS data.

Figure 7: Share of men and women with kids below 18 in the household in general population and samples of managers



Notes: Share of men and women with kids below 18 living in the household by year in the whole sample of the German SOEP and in subsamples of managers identified by the SOEP survey question whether the individual in their job is in a leadership position or using the 4th digit of the KldB 2010 Classification of Occupations.

Taken together, these gender differences in marital status and the presence of children in the household suggest that the newspaper coverage of company board members associating women more strongly with family does not accurately reflect average differences in family status among men and women in managerial roles.

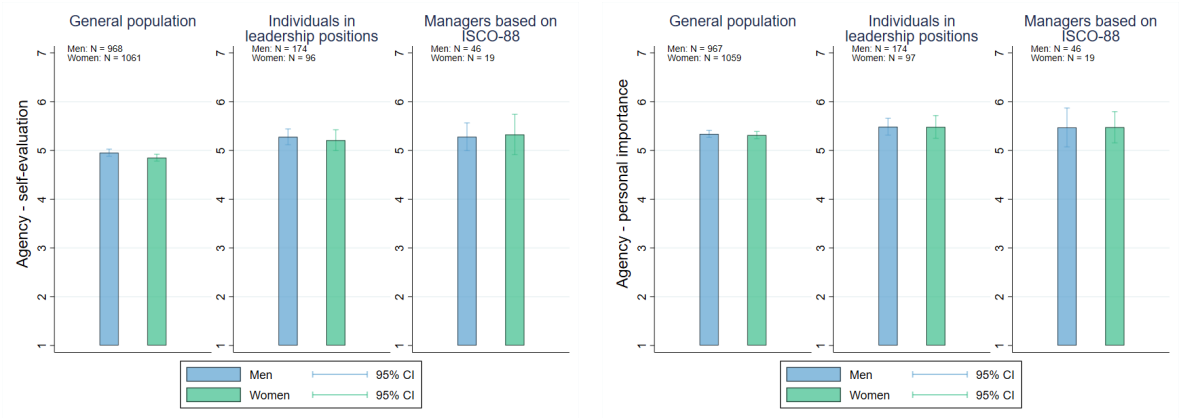
Agency and communion We use the SOEP-IS from 2012 to assess gender differences in agency and communion in the general population and in the subgroup of individuals in managerial roles. The SOEP-IS measures agency and communion through several items such as *competence* and *capability* for agency and *warm-heartedness* and *empathy* for communion. For each item, individuals are asked how they evaluate themselves on a scale from 1 to 7 as well as how important the item is for them personally on a scale from 1 to 7. The items measured have been used in similar compositions in a range of studies in social psychology (see, e.g., Abele et al. (2008), Gebauer et al. (2013), and Trapnell and Paulhus (2012)). The items are highly internally consistent with Cronbach's alpha ranging between 0.77 and 0.91 (Table A.1), indicating that the underlying concepts agency and communion are consistently measured. To get an aggregated scale of agency and communion for each individual, we calculate the average over agentic and communal items, again separately for self-evaluation and personal importance.

Men evaluate themselves as slightly but not significantly more agentic in the general pop-

ulation and there are no significant gender differences in agency for individuals in managerial positions. For personal importance there are also no gender differences in the general sample as well as both samples of managers (Figure 8). It can also be seen, though, that both men and women in leadership positions evaluate themselves as more agentic than in the general population and agency is also slightly more personally important to individuals in leadership positions than in the general population. This is in line with the notion that agency is an important characteristic for being successful in a leadership position.

Figure 9 shows that women evaluate themselves as more communal than men and that communion is also more important for women than for men in general population. These differences in communion persist but are smaller and only marginally significant ($p < 0.1$) for individuals in leadership positions and completely disappear for managers based on the ISCO classification.

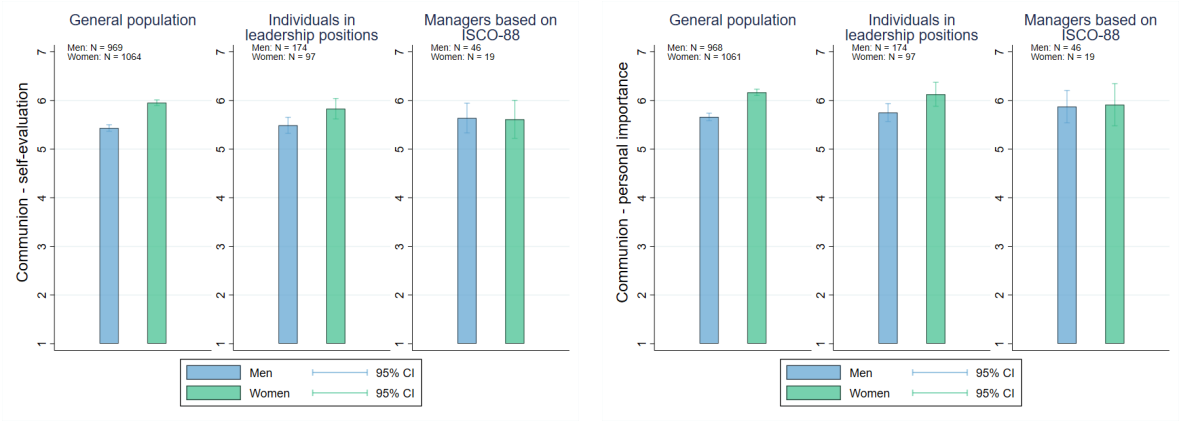
Figure 8: Self-evaluation and personal importance of agency of men and women in general population and samples of managers



Notes: Self-evaluation and personal importance of agency of men and women in the whole sample of the German SOEP and in subsamples of managers identified by the SOEP survey question whether the individual in their job is in a leadership position. The 4th digit of the KldB 2010 Classification of Occupations could not be used for the identification of managers as it is only available from 2013 onwards.

Based on the analysis of the SOEP-IS data on agency and communion, we conclude that the use of language related to agency and communion in board members' newspaper coverage to a large extent is not in line with average gender differences in agency and communion among individuals in managerial positions. In summary, the findings from this and the previous sections do not support the idea that gender differences and stereotypes in newspaper coverage of company board members can be explained by statistical discrimination. Instead, they suggest that female board members are portrayed in ways that do not align with the actual distribution of their characteristics and that exposure to more women attaining board positions over time did not lead to a decrease in this bias.

Figure 9: Self-evaluation and personal importance of communion of men and women in general population and samples of managers



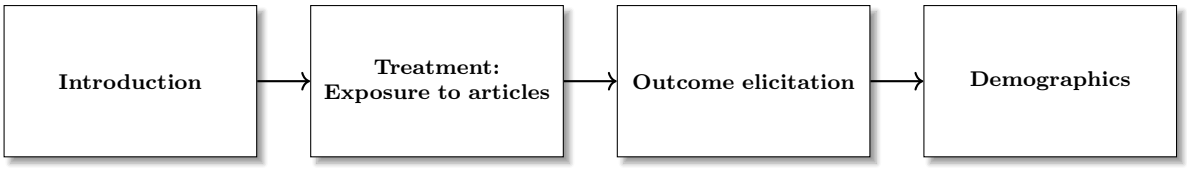
Notes: Self-evaluation and personal importance of communion of men and women in the whole sample of the German SOEP and in subsamples of managers identified by the SOEP survey question whether the individual in their job is in a leadership position. The 4th digit of the KldB 2010 Classification of Occupations could not be used for the identification of managers as it is only available from 2013 onwards.

3 Experimental Evidence on Stereotypes in Newspaper Articles

3.1 Experimental Design

We conducted an online experiment with a sample of German participants ($n \approx 3500$, of which ≈ 500 in the pilot and ≈ 3000 in the main study) between July and October 2024. [21] Participants were recruited through a survey company and the sample is representative of the German population in terms of gender, age (18 to 69 years), and education (low, medium, high). All sample instructions, texts, and questionnaires were given in German. Screenshots of all German instructions can be found in Appendix A.2. Figure 10 shows the overall flow of the experiment.

Figure 10: Flow of the experiment



Notes: Overview of the flow of the experiment. Participants that do not agree to the conditions of the experiment or meet the quota limit are directed out of the survey after the introduction.

3.1.1 Introduction

Participants were welcomed to the experiment and informed about the usage and protection of their survey data. They were also told that in addition to the show-up fee, they would be

[21] We pool the pilot and the main study since we did not implement any changes in the survey after the pilot. The pre-registration was completed before the pilot.

able to earn money depending on their responses to the questions given throughout the study. Participants were asked to agree to these conditions before reporting their gender, age, and level of education for quota sampling. If any of the quota limits was met, they were directed out of the survey.

3.1.2 Treatment: Exposure to articles

Participants were informed that they would see an article about the appointment of a real CEO in a real German company. They were told that the article was based on real German newspaper coverage of the company and the CEO, but that the company name, the CEO's name, any other personal names, and the city of the company's headquarters had been pseudonymized. They were asked to read the article carefully, as they would have the opportunity to earn additional money by correctly answering the following questions about the company and the CEO.

Participants were then randomly assigned to one of six treatment groups, and were shown the respective article that varied in the nature of information about the CEO's family status. Table 7 gives an overview of the different treatment groups. The gender of the CEO varies along two dimensions, male (M) and female (F). The family of each CEO was either not mentioned (1), mentioned neutrally (2), or a trade-off between family and career was highlighted. As coverage portraying a family-career trade-off can only be found for female CEOs in real newspaper articles (see section 2), we did not include this treatment version in the original randomization. For completeness, we nevertheless first pre-registered and then ran the treatment "family-career trade-off" for men (3M) a few weeks later on an equally representative German sample. Since there is no reason to believe that the 3M sample should be any different from our sample in the main study, we mostly compare the results for this group to all other treatments as if they had been in the same data collection round.

Table 7: Overview of treatment groups

gender CEO	no family info (1)	family mentioned (2)	family-career trade-off (3)
female (F)	x	x	x
male (M)	x	x	separately

Notes: Overview of information about the CEO's family status in the article shown to each treatment group. We refer to the different groups according to the gender of the CEO and the variation in family information as 1M, 1F, 2M, 2F, 3M, and 3F.

Each article shown consists of three paragraphs. The first paragraph is an announcement that a new person is taking over the position of the chair of the board (CEO) of the company PHARMA AG which is connected to the real German pharmaceutical company Merck KGaA. In the three male CEO groups, the new CEO is a man named Martin Bauer (based on their CEO from 2016-2021, Stefan Oschmann), in the other three groups, the new CEO is a woman named Martina Bauer (based on Belén Garijo, Merck's current CEO as of June 2025). The second paragraph provides some general description of the company and its business

activities. This paragraph is identical in all groups. The third paragraph provides biographical information about the new CEO, which is the same for the male and the female CEO given the almost identical biography of the two real CEOs the article is based on. However, at the end of this paragraph we vary the degree of gender-stereotypical representation by including information about the CEO's family in different ways.

For groups 1M (Figure 11) and 1F (Figure A.5), no information about the family is given. In groups 2M (Figure A.6) and 2F (Figure 12), the marriage and parental status of the CEO is briefly mentioned at the end of the paragraph by adding the sentence *"Bauer is married and father/mother of two children"*. In groups 3F (Figure 13) and 3M (Figure A.7), the marriage and parental status of the CEO are given, and, in addition, a trade-off between family and career is highlighted by adding the sentence: *"Bauer is married and a mother/father. She/He raised two children and still managed to have a successful career"*.

Figure 11: Translation of article text group 1M - male CEO and no information on family

Business

Leadership change at PHARMA AG: Martin Bauer appointed new CEO

At the beginning of next week, Martin Bauer will become the new Chairman of the Management Board at Oberdorfer Group PHARMA AG. The change is taking place as planned, according to information from Oberdorf. It was already in the air when Bauer was appointed Deputy Chairman of the Management Board last year.

PHARMA AG is one of the largest publicly traded companies in Germany. It was founded more than 350 years ago by Ludwig Maier. To this day, the company remains majority family-owned. PHARMA AG is divided into the business sectors of Healthcare, Life Science, and Performance Materials, and employs staff in more than 60 countries. Currently, PHARMA AG is working on the production of antibodies and proteins for the treatment of various types of cancer, as well as on high-tech laboratory equipment for the biopharmaceutical industry.

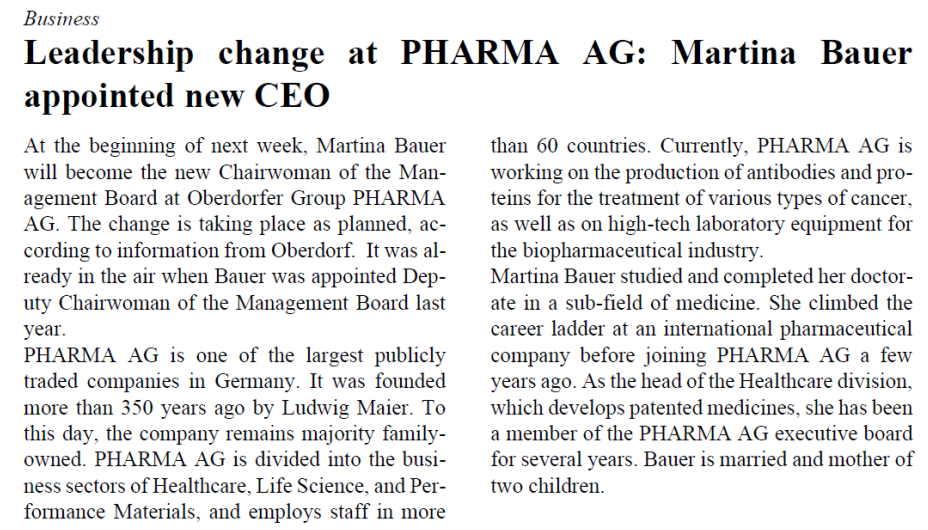
Martin Bauer studied and completed his doctorate in a sub-field of medicine. He climbed the career ladder at an international pharmaceutical company before joining PHARMA AG a few years ago. As the head of the Healthcare division, which develops patented medicines, he has been a member of the PHARMA AG executive board for several years.

Notes: English translation (using ChatGPT) of article shown to participants in treatment group with a male CEO and no family mention (1M). The original German text can be found in Figure A.15.

3.1.3 Outcome elicitation: incentivized questions on firm and CEO performance

After being presented with the articles on the CEO according to their treatment group, participants were asked four incentivized questions. These questions only vary across treatment arms by the gender of the CEO, but they do not mention any of the family-related information. Some of the questions were accompanied by unincentivized questions, either about the respondents' level of uncertainty regarding their answers or to explain their reasoning in free-text questions. At each question on an incentivized outcome, participants had the chance to re-read the respective article if they wished to do so.

Figure 12: Translation of article text group 2F - female CEO and information on family



Business

Leadership change at PHARMA AG: Martina Bauer appointed new CEO

At the beginning of next week, Martina Bauer will become the new Chairwoman of the Management Board at Oberdorfer Group PHARMA AG. The change is taking place as planned, according to information from Oberdorf. It was already in the air when Bauer was appointed Deputy Chairwoman of the Management Board last year.

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Martina Bauer studied and completed her doctorate in a sub-field of medicine. She climbed the career ladder at an international pharmaceutical company before joining PHARMA AG a few years ago. As the head of the Healthcare division, which develops patented medicines, she has been a member of the PHARMA AG executive board for several years. Bauer is married and mother of two children.

Notes: English translation (using ChatGPT) of article shown to participants in treatment group with a female CEO and neutral family mention (2F). The original German text can be found in Figure A.18.

Figure 13: Translation of article text group 3F - female CEO and information on family-career trade-off



Business

Leadership change at PHARMA AG: Martina Bauer appointed new CEO

At the beginning of next week, Martina Bauer will become the new Chairwoman of the Management Board at Oberdorfer Group PHARMA AG. The change is taking place as planned, according to information from Oberdorf. It was already in the air when Bauer was appointed Deputy Chairwoman of the Management Board last year.

PHARMA AG is one of the largest publicly traded companies in Germany. It was founded more than 350 years ago by Ludwig Maier. To this day, the company remains majority family-owned. PHARMA AG is divided into the business sectors of Healthcare, Life Science, and Performance Materials, and employs staff in more than 60 countries. Currently, PHARMA AG is working on the production of antibodies and proteins for the treatment of various types of cancer, as well as on high-tech laboratory equipment for the biopharmaceutical industry.

Martina Bauer studied and completed her doctorate in a sub-field of medicine. She climbed the career ladder at an international pharmaceutical company before joining PHARMA AG a few years ago. As the head of the Healthcare division, which develops patented medicines, she has been a member of the PHARMA AG executive board for several years. Bauer is married and a mother. She has raised two children and still managed to have a successful career.

Notes: English translation (using ChatGPT) of article shown to participants in treatment group with a female CEO and mentioning of family and career trade-off (3F). The original German text can be found in Figure A.19.

Outcome 1: Beliefs about stock performance in the year after CEO appointment
Participants were asked whether the stock of PHARMA AG performed better or worse in the year after the appointment of the CEO compared to the year before. Participants received €0.50 for answering this question correctly. Figure A.21 shows the original German text used to elicit this outcome. The correct answers are *worse* for Martina Bauer and *better* for Martin Bauer.[22]

As a follow-up, participants were asked by how much the stock out-/underperformed itself in the year after the appointment compared to the year before, depending on which answer they gave to the previous question. The ranges are 0-5, 5-10, 10-15 or more than 15 percentage points, respectively. This question was not incentivized since participants who had answered the first question incorrectly would have not able to answer the follow-up correctly anymore. Figure A.22 again shows the original German text.

Outcome 2: Investment in the firm's stock at the date of CEO appointment
Participants then had to split a total of €100 between an investment in the stock of PHARMA AG on the day of the CEO's appointment and a financial product that tracks the price performance of the German stock index (DAX).[23] Participants were informed that after the end of the study, five[24] respondents would be randomly selected to receive a payout equal to the value of their investment. The payout was based on the realized stock evolution of PHARMA AG, i.e. Merck KGaA, one year after the appointment of Martin/a Bauer. Figure A.23 displays the original German text that participants saw for this investment question. We additionally explained the meaning of the two options more in detail to avoid bias from different levels of financial literacy. The returns of PHARMA AG, i.e. Merck KGaA, in the year after their appointment were 18 percent for Martina Bauer (Belén Garijo) and 32 percent for Martin Bauer (Stefan Oschmann). The DAX returns in the same respective year amounted to -7 percent for Martina Bauer and 25 percent for Martin Bauer.

Outcome 3: Beliefs about CEO approval by employees on Glassdoor
Participants were asked about their beliefs regarding the approval of the CEO by their employees on the platform Glassdoor[25] approximately 1.5 years after the CEO appointment. The participants could choose a value on a scale from 0 (i.e. no employee that rated the CEO on Glassdoor approved them) to 100 percent (i.e. all employees that rated the CEO on Glassdoor approved them). As an anchor, the participants received the information that

[22]Participants were then also asked to assess how sure they were of their answer, ranging from *not sure at all* to *very sure*, including a neutral option.

[23]In the pilot, we tested two versions of this question with differing alternative investments to the firm stock: first, a secure savings account that would guarantee a two percent return for the year, and second, an investment in the DAX equivalent as described above. We decided to move forward with the latter option for the main study to avoid confounding this decision with the general willingness of the respondent to invest in the stock market.

[24]To keep the information given to the participants constant, we selected five participants in the pilot and five in the main study.

[25]See www.glassdoor.com (Last accessed: 07 November 2024).

in Glassdoor's latest report (from 2021) the average global CEO approval rate is 73 percent (see Figure A.24). Participants could earn €1 if they chose a value within a five percentage point range around the true CEO approval (93 percent for Martina Bauer and 89 percent for Martin Bauer). Additionally, we provided an unincentivized free-text question about what participants thought that employees perceive as either positive or negative about their CEO when providing the rating on Glassdoor (see Figure A.25). This question aimed at identifying mechanisms of our treatment effects.

Outcome 4: Beliefs about CEO 'survival'

In this question, participants were asked whether they believe the CEO is still in their position two years after appointment (Figure A.26). The correct answer in both cases was *yes*, and the participants earned €0.50 for answering this question correctly.[26] Participants were then asked to explain their reasoning in an unincentivized follow-up question (see Figure A.27). Given that most participants answered *yes* to the two-year 'survival' question in the pilot study, we added the same question with a five-year time horizon in the main study, for those participants that chose 'survival' in the two-year question. Given that for one of the real CEOs the study is based on less than five years after their appointment, this additional question could not be incentivized.

3.1.4 Attention check, demographics, and additional questions

After assessing the last incentivized outcome measure, we conducted an attention check on the participants to make sure they had been reading the questions carefully. Participants were asked to respond both *do not agree* and *fully agree* to a question about how easy it is to find reliable information in the media nowadays (Figure A.28).

After being thanked for their responses to the questions on PHARMA AG and its CEO, participants reported the following demographics: employment status (*full-time employed*, *part-time employed*, *self-employed*, *not employed/looking for work*, *minor or irregular employment*, *retired*, *student/apprentice*, and *other*/free-text), number (integer) of adults and children, and their gender in the household (*male*, *female*, and *non-binary/diverse*), total available monthly household income (*less than €1000*, *€1000 to €2000*, *€2000 to €3000*, *€3000 to €4000*, and *more than €4000*), newspaper reading frequency (*daily*, *at least once/week*, *several times/month*, *approx. once/month*, and *less than once/month*), and their preferred newspapers (ten largest German newspapers in online and print and *other*/free-text).

Participants also gave information about their risk attitudes (*not at all willing to take risks*, *rather not willing to take risks*, *riskneutral*, *rather willing to take risks*, and *very willing to take risks*) and their experience in investing in the stock market, both whether they had ever invested in the stock market (*yes*, *no*, and *don't know*) and if yes, the frequency (*daily, weekly, 1-2 times/month, 1-2 times/quarter, 1-2 times/year, less than once/year*). They were further asked to state whether they had tried to look up information about the firm and their

[26] As for outcome 1, participants could rate how sure they were about their answer.

to (more correctly) answer the incentivized questions (*yes*, *no*, and *yes, but could not find anything*) and what they thought the topic of the study had been (free-text).

To understand mechanisms of potential treatment effects, we also asked participants in which newspaper they could imagine an article like the treatment article to be published (the options were again the 10 largest German newspapers in online and print). To get an idea of individuals' descriptive and injunctive gender norms, we ask participants about their beliefs regarding the share of women as CEOs in DAX companies (in percent) and if they think that women's representation in upper management should change (*should increase significantly*, *should increase slightly*, *should remain the same*, *should decrease slightly*, and *should decrease significantly*). Similarly, we elicit the gender of the CEO/managing director of their employer (*male*, *female*, *non-binary/diverse*, *I don't know*, and free-text to explain if, for instance, employer has no or several CEOs). These last questions are only asked after the question on the assumed topic of the study to avoid pointing participants in the direction of gender differences in upper management. Lastly, participants got the chance to voice any feedback on the study. We told participants that the survey would last 10-15 minutes and in fact, the median completion time was a bit more than nine minutes. Ninety percent of respondents have completed our survey within 21.6 minutes.

3.2 Sample and Descriptive Statistics

Our sample consists of 3,476 respondents and is representative of the German population according to gender, age, and education. Table A.7 gives an overview of the respondents' employment status, household size, and household income for the full sample of pilot and main study. Most participants are full-time employed (45 percent), part-time employed (16 percent) or retired (16 percent), and earn between 1000€ and 4000€ per month in the household. The median household in our sample has one female and one male household member above age 18, around 30 percent of respondents report to have at least one household member below the age of 18 living with them.

In addition to demographic information, we also asked participants about some study-specific characteristics, in particular their newspaper reading behavior, risk aversion, and investment behavior. Table 8 summarizes these characteristics. Around 65 percent of respondents report to read newspapers offline or online at least once per week or daily, 19 percent have a newspaper reading frequency of less than once per month.[27] Similarly, 65 percent of the sample consider themselves risk-neutral or slightly risk-averse. 43 percent of participants have ever invested on the stock market, of which almost 50 percent do this at least once per

[27] We additionally ask about the newspapers that individuals prefer to read. We propose the ten most popular newspapers on- and offline using data from the German Federal Statistical Office *Statistisches Bundesamt* and respondents can choose as many of the newspapers as they like. While the shares are relatively evenly distributed among the ten newspapers (between 6 and 28 percent), almost 40 percent of participants state that they (additionally) consume news from other sources which mostly appear to be regional newspapers or more general news websites such as "t-online" or "msn". Interestingly, the tabloid "BILD-Zeitung" as the by far the most-read newspaper in Germany (statista, 2024) is not as strongly present in our sample.

month. Another 24 percent of respondents with stock market experience are active on the stock market less than once per year.[28]

Table 8: Study-related characteristics of survey sample

	(1) Obs.	(2) Mean	(3) Median	(4) Std. Dev.	(5) Min.	(6) Max.
Frequency newspaper reading:						
<once/month	3,476	0.19	0.00	0.39	0	1
approx. once/month	3,476	0.05	0.00	0.22	0	1
several times/month	3,476	0.12	0.00	0.32	0	1
at least once/week	3,476	0.27	0.00	0.44	0	1
daily	3,476	0.37	0.00	0.48	0	1
Risk aversion:						
very willing to take risks	3,476	0.03	0.00	0.16	0	1
rather willing to take risks	3,476	0.20	0.00	0.40	0	1
riskneutral	3,476	0.35	0.00	0.48	0	1
rather not willing to take risks	3,476	0.29	0.00	0.45	0	1
not willing to take risks at all	3,476	0.13	0.00	0.34	0	1
Experience investing:						
No	3,476	0.55	1.00	0.50	0	1
Yes	3,476	0.43	0.00	0.49	0	1
Don't know	3,476	0.02	0.00	0.15	0	1
Frequency investing:						
less than once/year	1,484	0.24	0.00	0.43	0	1
1-2 times/year	1,484	0.12	0.00	0.33	0	1
1-2 times/quarter	1,484	0.15	0.00	0.36	0	1
1-2 times/month	1,484	0.24	0.00	0.43	0	1
weekly	1,484	0.18	0.00	0.38	0	1
daily	1,484	0.07	0.00	0.26	0	1

Notes: Descriptive statistics of study-related characteristics on newspaper reading behavior, risk aversion, and investment behavior of study participants. Balancing checks by treatment group on these variables can be found in Table A.8.

Given the randomized nature of our experiment together with the quotas for age, gender, and education, we do not expect any major imbalances by background characteristics in our sample. Table A.8 shows the balance of all individual characteristics described above. The respondents are close to evenly distributed among the five treatment arms and are balanced along the main dimensions used for quota sampling, namely age, gender, and education. Small imbalances are observed for very rare groups like non-binary respondents and other

[28]In the overall German population, 17.6 percent of Germans stated to currently own stocks or portfolios of stocks in the last data collection in 2023 (DAI, 2023).

educational degrees than the ones presented for the quotation.[29] Similarly, there are selected imbalances for specific categories of some background variables such that we always show empirical specifications with and without controls for these demographics.

After completion of the treatment, we asked respondents about their beliefs or opinions on study-related topics. Given the incentivization of outcomes related to the real company the articles are based on, we asked respondents whether they had tried to find any information on the real firm while answering the survey. Most respondents report that they either did not look up the firm (91 percent) or that they did but could not find any useful information (around 3 percent, see Table 9).[30] Relatedly, we ask for a guess regarding the topic of the study, in free-text format. We classify answers based on whether they mention terms related to a certain topic.[31] The largest category we can identify relates to *management and business* (around 35 percent of respondents) whereas around 20 percent of respondents state they don't know what the study was about (see Figure A.11). 10 to 15 percent mention topics related to *media*, *pharma and medicine*, or *financial markets*. Slightly less than 10 percent mention topics related to *women/gender*, and this is more pronounced in the treatment groups with a female CEO.

Finally, we assessed the norms and perceptions of respondents around women in leadership positions, before giving them the chance to provide more general free-text feedback on the study. First, participants were asked to estimate the share of female CEOs among the 40 companies in the German stock index (DAX). The correct share at the time of the experiment was 1/41, i.e. 2.4 percent, and respondents vastly overestimate this figure (mean 29 percent, median 25 percent, see Table 9)[32]. Nonetheless, a majority of participants thinks that the share should be slightly or significantly higher (more than 75 percent). Only two percent would like the share of women as CEOs to be lower. Lastly, almost two thirds (19 percent) of our sample have a male (female) CEO in their own firm. Almost 15 percent don't know the gender of their employer's CEO or provide other answers, e.g. that they don't work or that

[29]While we cannot check for this, there is a chance that respondents strategically choose these answering options assuming that there is no quota on them. This might be especially true for respondents who are very familiar with such surveys and hence understand that the longer a survey has been posted on the platform, the more likely it is that some quotas are already full.

[30]We furthermore ask respondents in which of the most popular 10 German online and offline newspapers they could imagine the treatment article to appear in (not mutually exclusive). A large share of participants (around 25-30 percent respectively) expects such an article to appear in the popular general-interest newspapers Süddeutsche Zeitung, FOCUS, Spiegel, ZEIT, and WELT or their respective online counterparts. Almost half of the participants (49 percent) additionally flag the business newspaper Handelsblatt (including online) as a source for the article.

[31]The list of terms capturing topics are generated using ChatGPT with the following request separately for each topic (in German): "I would like to measure whether a text mentions the topic xyz. Can you create a list of terms that I can search for?"

[32]We ran the experiment between July and October 2024. Until September 2024, only Belén Garijo was leading a DAX-40 company as CEO, namely Merck KGaA. Zalando had two CEOs at the time, Robert Gentz and David Schröder, such that the total number of CEOs was 41. In October 2024, two further DAX-40 companies started to be led by women, Commerzbank by Bettina Orlopp and Daimler Truck Holding AG by Karin Rådström. This corresponds to 3/41, i.e. 7.3 percent. After our experiment (December 2024), the female-led (Helen Giza) company Fresenius Medical Care returned to the DAX 40 such that the current number (as of June 2025) is 4/41, i.e. 9.8 percent and still much lower than the estimates of our respondents.

their company has multiple CEOs.[33]

Table 9: Look-up behavior and study-related opinions of survey sample

	(1) Obs.	(2) Mean	(3) Median	(4) Std. Dev.	(5) Min.	(6) Max.
Tried to look up firm:						
No	3,476	0.91	1.00	0.29	0	1
Yes	3,476	0.06	0.00	0.25	0	1
Yes, but could not find anything useful	3,476	0.03	0.00	0.16	0	1
Belief share of women as CEOs	3,476	29.28	25.00	19.69	0	100
Desired change in female CEO share:						
Should be significantly lower	3,476	0.01	0.00	0.10	0	1
Should be slightly lower	3,476	0.01	0.00	0.10	0	1
Should stay same	3,476	0.26	0.00	0.44	0	1
Should be slightly higher	3,476	0.39	0.00	0.49	0	1
Should be significantly higher	3,476	0.33	0.00	0.47	0	1
Own CEO gender:						
Male	3,476	0.66	1.00	0.47	0	1
Female	3,476	0.19	0.00	0.40	0	1
Diverse	3,476	0.01	0.00	0.09	0	1
Don't know	3,476	0.09	0.00	0.28	0	1
Other	3,476	0.05	0.00	0.22	0	1

Notes: Descriptive statistics on look-up behavior and opinions related to women in leadership positions. Balancing checks by treatment group on these variables can be found in Table A.9.

3.3 Experimental Results

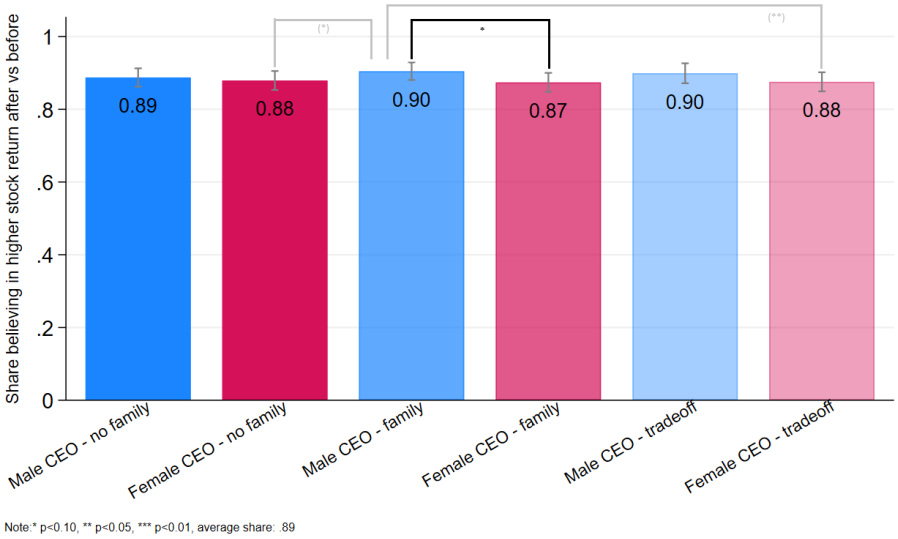
In this section, we present the estimation results on our main incentivized outcomes (section 3.3.1) as well as the unincentivized free-text questions that aim to uncover mechanisms behind respondents' reasoning (section 3.3.2). Lastly, section 3.3.3 presents heterogeneities in treatment effects by gender and parental status.

3.3.1 Main incentivized outcomes

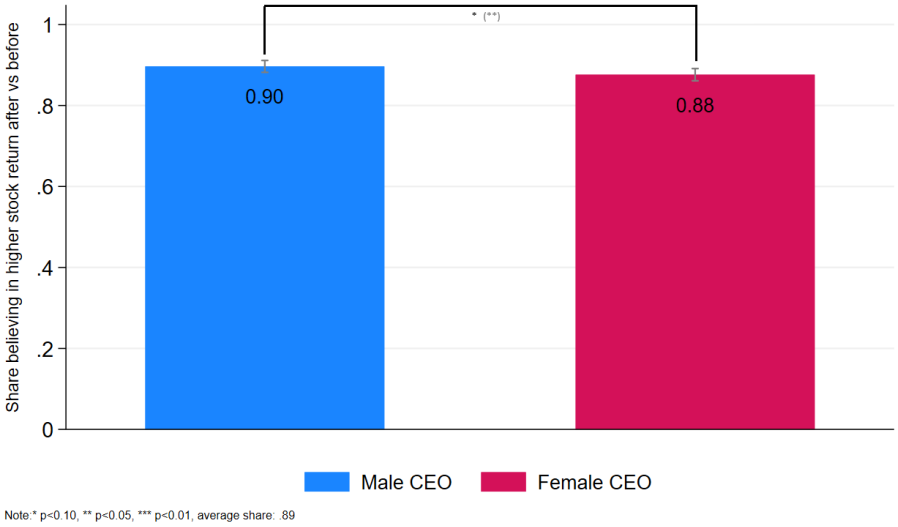
Outcome 1: Beliefs about stock performance in the year after CEO appointment
We first ask whether respondents assess the performance of PHARMA AG differently depending on the gender of the presented CEO and their stereotypical representation in the newspaper article. Overall, 88.6 percent of respondents believe that the company performed better in the year after CEO appointment compared to the year before, the rest thinks the firm performed worse, there is no neutral option.

[33]Table A.9 shows a balancing check for these study-related attitudes. We only observe one minor imbalance related to the *other* category of own CEO gender. Nonetheless, we again provide estimates for our treatment effects in section 3.3 including these characteristics as control variables (so-called *further study controls*).

Figure 14: Shares of respondents expecting better stock performance after CEO appointment



(a) All treatment groups



(b) CEO gender

Notes: Results of regression of incentivized outcome 1 (beliefs about stock performance in the year after CEO appointment) on treatment group dummies and control variables, and p-values of treatment effects for different treatment group comparisons (panel a). Results of regression of incentivized outcome 1 on CEO gender dummy and control variables (panel b). *p <0.10, **p<0.05, ***p<0.01. Gray lines and stars indicate significant differences when including control variables. For corresponding estimates, see Table 10.

While there are some small differences by treatment status regarding the expected stock performance after CEO appointment, the most robust difference is between all groups with male and female CEOs. Figure 14 shows the shares of respondents who expect the stock of PHARMA AG to perform better in the year after CEO appointment compared to the year before, by treatment group (panel a) and by CEO gender (panel b). Panel (a) shows

that differences across all groups are small, with a maximum of three percentage points which corresponds to 3.5 percent of the average share. The only robust difference appears between the two groups where the family is mentioned neutrally but statistical significance is only marginal. When including demographics and study-related characteristics are added as controls, the two other treatment groups with a female CEO also become statistically distinguishable from the 2M group such that when pooling all female CEO groups, there is a robust difference of two percentage points between articles with female CEOs compared to male CEOs (panel b).

Table 10: Treatment effects on beliefs about stock performance after CEO appointment

	Outcome: share of respondents expecting better stock performance					
	(1)	(2)	(3)	(4)	(5)	(6)
Baseline mean:	88.74% (1M)			89.66% (Male CEO)		
2M - family neutral	0.017	0.015	0.017			
	(0.018)	(0.018)	(0.017)			
1F - no family	-0.008	-0.014	-0.015			
	(0.018)	(0.018)	(0.018)			
p-value 1F-2M:	[0.163]	[0.110]	[0.067*]			
2F - family neutral	-0.014	-0.014	-0.015			
	(0.019)	(0.018)	(0.018)			
p-value 2F-2M:	[0.092*]	[0.108]	[0.066*]			
3F - family trade-off	-0.012	-0.020	-0.021			
	(0.019)	(0.020)	(0.020)			
p-value 3F-2M:	[0.111]	[0.056*]	[0.034**]			
3M - family trade-off	0.012	0.003	0.005			
	(0.019)	(0.020)	(0.020)			
CEO gender				-0.021*	-0.022**	-0.025**
				(0.011)	(0.011)	(0.011)
Control for individual demographics	No	Yes	Yes	No	Yes	Yes
Further study controls	No	No	Yes	No	No	Yes
R-squared	0.001	0.034	0.046	0.001	0.034	0.046
N	3,476	3,476	3,476	3,476	3,476	3,476

Notes: Results of regression of incentivized outcome 1 (beliefs about stock performance in the year after CEO appointment) on treatment group dummies and control variables, and p-values of treatment effects for different treatment group comparisons (columns 1-3). Results of regression of incentivized outcome 1 on CEO gender dummy and control variables (columns 4-6). Standard errors in parenthesis, *p <0.10, **p<0.05, ***p<0.01.

Table 10 shows the treatment effects compared to the male treatment without family information (1M) as a baseline (columns 1-3) as well as a comparison for all treatments with a male CEO (1M, 2M, 3M; baseline) and those with a female CEO (1F, 2F, 3F; columns 4-6) with varying sets of controls. There is a strong and persistent difference in expected performance between a female-led company compared to one with a male CEO. We first compare all treatment groups to the baseline treatment of a male CEO without mentioning his family as this is the most common and neutral coverage we observe in real newspaper articles (see chapter 2). There is no significant difference in the share of respondents who expect the firm to perform better between the neutral male baseline treatment and all other treatments

(columns 1-3, Table 10). The coefficient is positive for the 2M treatment mentioning the family neutrally for men which would indicate a reward for family information of men, potentially due to more identification with the CEO if personal information is provided. All coefficients for the female treatments are negative suggesting a penalty for female CEOs in the expected stock performance being better or worse than in the year before CEO appointment. This is confirmed by the results in columns 4-6 that compare all treatments with a male CEO to all female CEO treatments. Mentioning a female CEO in our treatment article leads to a reduction in the share of respondents expecting a better stock performance of up to 2.5 percentage points compared to a baseline of almost 90 percent.

The differential assessment of stock performance based on CEO gender is driven by coverage that neutrally mentions the male CEO's family. Table 10 additionally reports the p-values of tests on coefficient differences between all female treatment groups and the male treatment group mentioning the family neutrally (2M). Focusing on column 3 that includes demographic and study controls, we see that all coefficients on female treatment groups are significantly different from 2M coefficients, at least at the 10 percent level.

These results suggest that neutrally mentioning families of CEOs may particularly activate gendered care stereotypes in respondents' reasoning that lead to an assessment difference of their quality as CEOs. Although the coefficients are not significantly different between the female treatments, the effect size is largest for the 3F treatment group that highlights the (successfully navigated) trade-off between family and career for the female CEO.[34] The coefficient sizes imply a 1.4-2 percentage point decrease in the share of respondents expecting a better stock performance after CEO appointment, relative to a baseline share of 90.43 percent in the 2M treatment.[35]

Outcome 2: Investment in the firm's stock at CEO appointment

While expected firm performance on the stock market gives a first indication of respondents' assessment of perceived CEO impact on firm outcomes, we are also interested in real investment decisions of participants. To this end, we let participants choose how to invest a total of €100 into either the stock of PHARMA AG or a financial portfolio following the trend of the German stock index (DAX). The money would be invested for one year after CEO appointment, and respondents are aware that five of them will randomly be picked to receive the realized values of these investments after the experiment. Hence, investment decisions in this question may reflect actual investment behavior in the stock market.

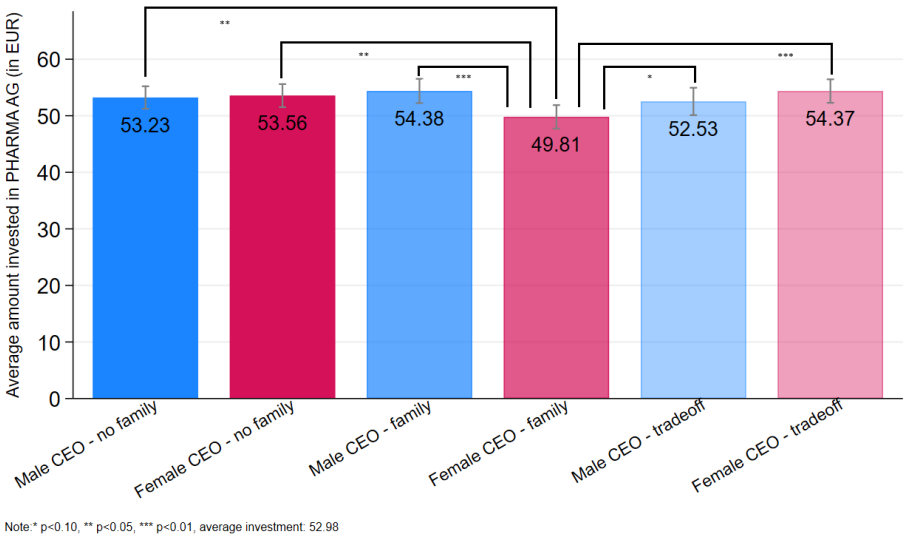
The investment behavior of our respondents is substantially different when the family of a female CEO is neutrally mentioned compared to all other treatment groups. Figure 15 shows the investment sum in the PHARMA AG stock out of €100. The average investment across all

[34] This seems to be partially driven by respondents' confidence about their answers within the female CEO treatments as reported in Table A.10. In particular, respondents are significantly less confident about their answers in the treatment that neutrally mentions the female CEO's family compared to a female CEO without family mention.

[35] We do not find any differences in the expected range of better or worse stock performance in five-percentage-point categories (not shown).

groups is around €53, i.e. respondents on average invest a bit more than half of their budget in the stock instead of the DAX ETF. [36] The investment is significantly lower compared to all other groups in the treatment that mentions the family of a female CEO neutrally. The largest difference occurs compared to the neutral family treatment of a male CEO, so within the same treatment category in terms of framing. The difference between these groups is almost €4.60 which corresponds to 8.6 percent of the sample average. All comparisons are statistically significant, both with and without controls. [37]

Figure 15: Investment into stock of PHARMA AG out of €100



Notes: Results of regression of incentivized outcome 2 (investment in stock of PHARMA AG compared to DAX ETF out of €100 at date of CEO appointment) on treatment group dummies and control variables, and p-values of treatment effects for different group comparisons. *p <0.10, **p<0.05, ***p<0.01. For corresponding estimates, see Table A.11.

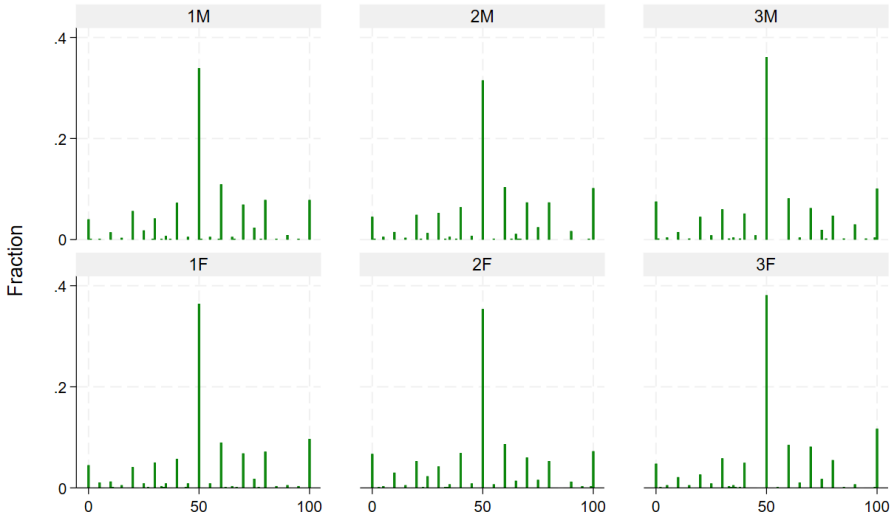
To understand whether these treatment effect stems from shifts around the mean of the distribution or movements to extreme investments, Figure 16 shows the distribution of investment sums across respondents, separately by treatment group. Overall, the investment distribution looks very similar for all treatment groups, with a high share of respondents choosing exactly half (€50) and relatively more respondents between €50 and €100. In group 2M (neutral family mention for male CEO), the share investing exactly half is relatively lower in favor of a more respondents investing the whole €100 in the firm stock. Instead, the fraction of participants investing €100 in group 2F is lowest. Furthermore, there is a notable increase

[36] This may seem surprising since rational investors could be inclined to invest more into the DAX portfolio. A potential reason for this behavior is the very positive narrative about the firm that the articles convey. In fact, the high share of respondents that expect the stock to perform better after CEO appointment than before speaks in favor of this channel.

[37] Table A.11 again summarizes these treatment effects compared to the baseline treatment of a male CEO without mentioning his family (1M). In the pilot to this study, we had tried a version of this question where respondents could invest into a savings account with a guaranteed return of 2 percent on their investment instead of the DAX ETF. The 247 participants who were presented with this alternative investment are hence not part of the estimation sample for Table A.11.

in zero investments compared to the other groups except 3M. Interestingly, the distributions for the two trade-off treatments (3F and 3M) are very similar.

Figure 16: Distribution of investment in stock of PHARMA AG out of €100



Notes: Distribution of investment in stock of PHARMA AG compared to DAX ETF out of €100 by treatment group. The y-axis denotes the fraction of respondents within each treatment group investing a particular amount.

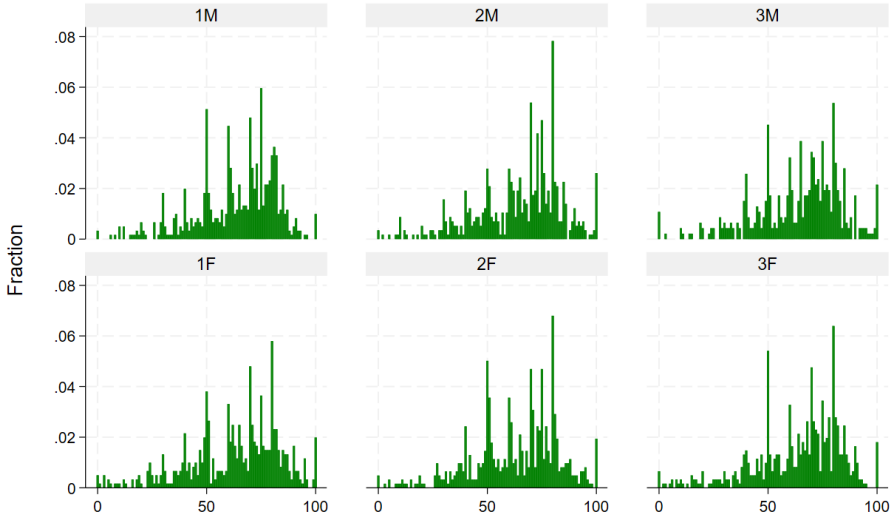
The evidence from Figure 15, Table A.11, and Figure 16 suggests that there is no penalty for women if the family is mentioned in a context that highlights the trade-off between family and career. One potential explanation for this is that the additional information given to respondents about this particular female CEO having managed to combine family and career successfully resolves the uncertainty around care obligations of this CEO and sends a signal of high ability. Instead, the treatments that neutrally mention the family could cater to a more stereotypical mindset for the participants. It may lead participants to think that a female CEO is very involved in their family responsibilities and hence may be less able to also perform well on the job whereas a man seems to be particularly likable for being a 'family father'. We will explore this further in the free-text answers in section 3.3.2.

Outcome 3: Beliefs about CEO approval by employees on Glassdoor

Thinking about employees' assessment of CEOs could lead to very different hypotheses compared to firm performance. While caring for a family seems potentially detrimental to firm success due to increased obligations on other dimensions than work, family involvement might come with an increased ability to care for employees, or it may foster identification with the CEO among employees who have children. While we don't observe any statistically significant differences in respondents' beliefs about employee satisfaction with the CEO 1.5 years after their appointment on the platform Glassdoor, there is weak evidence that male CEOs are associated with higher employee ratings if they have a family (see Table A.12). Figure

17 shows that this seems to be driven by a general shift of the distribution in 2M to the right, but also by more participants assuming that the male CEO has a perfect score among employees. No striking patterns can be observed for the female CEO treatment groups: although all coefficients are negative in our preferred specification in column 3 of Table A.12, the overall difference between male and female CEOs is not statistically distinguishable from zero.

Figure 17: Distribution of believed CEO approval of employees



Notes: Distribution of beliefs about CEO approval of employees on Glassdoor by treatment group. The y-axis denotes the fraction of respondents within each treatment group believing in a particular approval score.

Outcome 4: Beliefs about CEO 'survival'

As a last outcome, we elicited respondents' beliefs about the persistence of the female and male CEOs in their leading position. This question aims at isolating the perceptions about CEO competence as well as potential consequences of the expected firm performance and employee ratings as assessed in the previous outcomes. For example, participants could be thinking about the firm going very well in the year after CEO appointment, employees being very satisfied with the CEO around 1.5 years after appointment and hence assume that this person is still CEO after two years, and vice versa. With this medium-term persistence, we are hence most likely going to measure direct consequences of performance and employee rating while asking about 5-year 'survival' captures competence in a longer time horizon.

As for firm performance, expected 'survival' after two years is overall very high at 88.4 percent. Again, there is no significant difference between treatment groups (see columns 1-3 of Table A.13). Beliefs about 5-year CEO 'survival' are considerable more pessimistic (69.8 percent), but again there is no differences by CEO gender or stereotypical representation (columns 4-6).[38]

[38]There is also no pattern in confidence about respondents' answer to this question (not shown).

3.3.2 Mechanisms from text analysis

Two free-text questions allow us to explore some of the mechanisms we eluded to in section 3.3.1. We allow respondents twice to explain the reasoning behind their answers. First, we ask them to elaborate on positive and negative characteristics of a CEO that employees might consider when ranking them on Glassdoor. Second, we elicit why individuals expect a CEO to (not) be in their position two years after their appointment, hereby highlighting that they should keep in mind their reasoning for all presented outcome questions. In both cases, participants have to provide at least 25 characters before being allowed to move on to the next question, and the button to proceed to the next question only appears after ten seconds.

A first step to analyze the answers to these questions is to assess their quality. To this end, we define nonsense-answers as those who only contain special characters or numbers, that are composed of only one letter, or that do not contain any word from the German vocabulary of the spaCy library[39]. Overall, the share of nonsense-answers is between two and seven percent in the two free-text answering options (see Table 11). Furthermore, the correlation between providing a nonsense-answer in either of the questions is around 0.6, i.e. positive and relatively high (not shown).[40]

Table 11: Distribution of nonsense-answers

	Whole sample	1M	2M	1F	2F	3F
Nonsense Q3 Approval reason	0.03	0.04	0.04	0.03	0.05	0.02
Nonsense Q4 Survival reason	0.02	0.02	0.03	0.03	0.03	0.01
Nonsense Q4 No-Survival reason	0.07	0.11	0.05	0.06	0.06	0.07
Diff. Q3 Approval vs Q4 Survival Reason	.01***	.02**	.01	0	.02*	.01
	(2.96)	(2.38)	(.8)	(.15)	(1.85)	(1.59)
Diff. Q3 Approval vs Q4 No-Survival Reason	-.04***	-.07***	-.01	-.04*	-.02	-.05***
	(-3.55)	(-2.77)	(-.31)	(-1.66)	(-.65)	(-2.84)
N(Q3)	3011	604	575	604	618	610
N(Q4 Survival)	2662	531	510	525	555	541
N(Q4 No-Survival)	349	73	65	79	63	69

Notes: Share of answers identified as nonsense for question on reasons for Glassdoor approval and reasons for beliefs about why CEO is still in place after two years (for participants believing in 'survival') or not (those believing in 'no-survival') as well as differences in shares of nonsense-answers between questions overall and within each treatment group. T-statistics in parenthesis, *p <0.10, **p<0.05, ***p<0.01.

Interestingly, there is some variation in the share of nonsense-answers, both by question type and treatment group. The share of nonsense-answers is significantly lower (higher) for those who indicated that the CEO would (not) 'survive' in their position for two years. This seems to be driven by treatment groups 1M and 2F for 'survival' compared to 1F, 1M, and 3F for no survival. Additionally, there seems to be a treatment effect on the share of nonsense-answers for the question on employee approval. In particular, respondents in group 3F provide

[39]See https://spacy.io/ (Last accessed: 04 November 2024).

[40]Running a simple regression of an indicator on ever providing a nonsense-answer on all control variables we use in our regressions shows that nonsense-answers are less common among females, the oldest respondents, those who have ever invested in the stock market, those who did not look up information on the real firm, those who want more females as CEOs in German DAX firms, and those who themselves have a female CEO (not shown). Hence, simply excluding these respondents would lead to a selected subsample of participants.

significantly fewer nonsense-answers compared to the baseline treatment 1M (see Table A.14). One potential explanation may be that they feel more of an urge to explain their answer when being assigned the female treatment article with a family-career trade-off.

An additional dimension of interest is the share of respondents who seem to be answering out of intuition rather than for specific reasons.[41] To detect them, we search for answers containing variations of the phrase *"I don't know"* (e.g. *I have no idea*, *no clue*, ...). Overall, between 6 and 20 percent of respondents provide such an answer for the questions about employee approval and CEO 'survival' in the firm (Table 12). Again these shares are significantly different between the questions: compared to the share of don't know-answers in the reasoning on outcome 3, the share of don't know-answers in the reasoning on outcome 4 is significantly lower (higher) for those participants believing in CEO 'survival' ('no-survival'). These differences remain stable across treatments groups for participants believing in 'survival', and are mostly driven by 1M and 2F for 'no survival'. Additionally, there is evidence for a difference in the share of non-substantiated answers between the two treatments without family mention for the question on 'survival' (1M and 1F, see Table A.15).

Table 12: Distribution of don't know-answers

	Whole sample	1M	2M	1F	2F	3F
Don't know Q3 Approval reason	0.13	0.13	0.12	0.13	0.13	0.13
Don't know Q4 Survival reason	0.06	0.08	0.05	0.05	0.06	0.05
Don't know Q4 No-Survival reason	0.20	0.23	0.18	0.16	0.24	0.19
Diff. Q3 Approval vs Q4 Survival Reason	.07***	.05***	.07***	.08***	.07***	.07***
	(8.67)	2.78	3.77	4.77	3.88	4.28
Diff. Q3 Approval vs Q4 No-Survival Reason	-.08***	-.11**	-.06	-.04	-.11**	-.06
	(-3.91)	(-2.47)	(-1.49)	(-.96)	(-2.42)	(-1.44)
N(Q3)	3011	604	575	604	618	610
N(Q4 Survival)	2662	531	510	525	555	541
N(Q4 No-Survival)	349	73	65	79	63	69

Notes: Shares of don't know-answers for question on reasons for Glassdoor approval and reasons for beliefs about why CEO is still in place after two years (for participants believing in "survival") or not (those believing in "no survival") as well as differences in shares of don't know-answers between questions overall and within each treatment group. T-statistics in parenthesis, *p <0.10, **p<0.05, ***p<0.01.

For the further analysis of the text answers, we pre-process all texts following standard techniques from natural language processing. All texts are converted to lower case, and numbers, punctuation, and special characters are removed. We take out all common German stopwords combining the collections from Python's advertools[42] and NLTK[43] libraries as well as prepositions, conjunctions, and some colloquial fillers (e.g., *blabla*). Using the spaCy library, all words are reduced to their grammatical roots (lemmatization). Furthermore, we combine some words that appear frequently to n-grams (*e.g., fresh_ wind*) and group some words that

[41] Potentially, not giving any reasoning reflects a lack of interest in the survey which is equally interesting to our analysis.

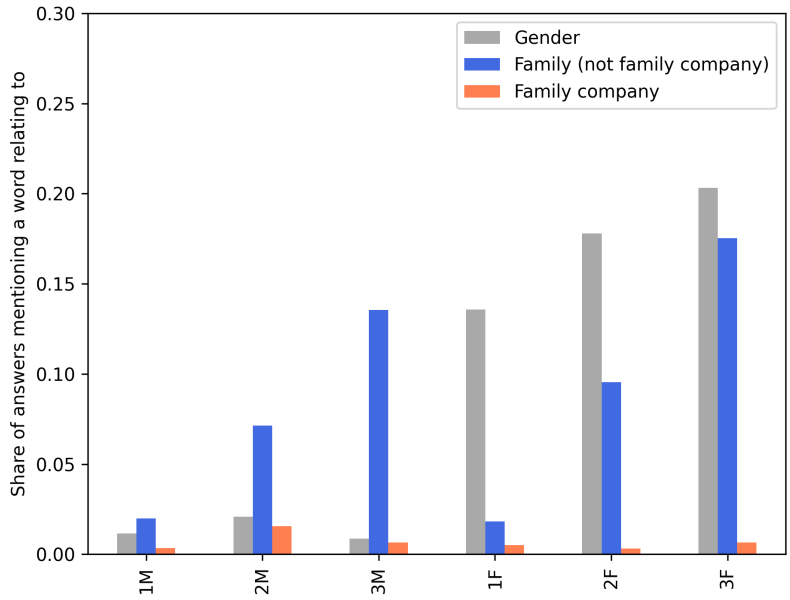
[42] See https://advertools.readthedocs.io/en/master/advertools.stopwords.html (Last accessed: 04 November 2024).

[43] See https://www.nltk.org/search.html?q=stopwords (Last accessed: 04 November 2024).

refer to positions in a grammatically gendered way[44]. Finally, we remove CEO names and words that directly refer to the question text.

Given the focus of our study on gender and family of the CEOs, we assess the importance that participants assign to these concepts in their reasoning. For this purpose, we calculate the share of answers that mention terms related to the topics gender and family. The list of terms capturing gender and family are generated using ChatGPT.[45] To deal with the fact that sometimes respondents mention the term *family* in relation to PHARMA AG being a family-owned company, we separately search for terms capturing this aspect (e.g., *family business*) and exclude these from capturing the topic family more generally. Figure 18 shows that the topic gender is predominantly mentioned in treatments with a female CEO (in 14 to 20 percent of responses). The topic family is generally brought up more often in the treatments where the family is mentioned, both for the male and female CEO. Additionally, this share increases in treatments 3F and 3M that mention the family-career trade-off (between 14 and 17 percent of all answers).[46]

Figure 18: Mentioning of gender and family words in reasoning on Glassdoor approval



Notes: Shares of answers mentioning at least one term related to gender, family or PHARMA AG as family-owned business for question on reasons for Glassdoor approval by treatment group.

In addition to mentioning terms related to family and gender, the sentiment attached

[44]In German, most occupations and many words used to refer to a man or woman in a certain position are gendered. E.g the term *chefin* refers to a female boss while *chef* refers to a male boss. We group these terms as *chef_in*.

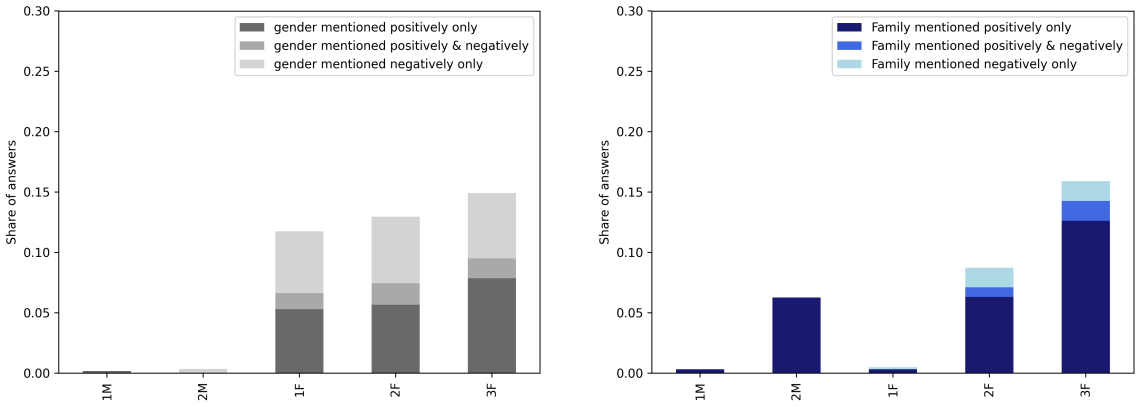
[45]We use the following request separately for gender and family in ChatGPT (in German): "I would like to measure whether a text mentions the topic family (gender). Can you create a list of terms that I can search for?"

[46]Figure A.8 shows the same bar graphs for the reasoning regarding CEO 'survival'. The shares of respondents mentioning gender and family are lower, but the general patterns from Figure 18 hold.

to these concepts can give further indication of mechanisms driving participants' decision-making. To assess this, we manually tag whether a family- or gender-related word has a more positive or negative connotation (or both).[47] Figure 19 shows the share of sentiments across treatment groups for the question about employee approval on Glassdoor. While the few answers relating to gender in the treatment groups with a male CEO are rarely associated with a specific sentiment, the gender-related parts within the female CEO treatments are mostly balanced in their positive and negative connotation. For the trade-off treatment 3F there is a larger portion of positive mentions.

Family-related words (not related to family businesses) are mostly mentioned in a positive way which may be related to the assumption that CEOs with a family are particularly able to take care of their employees. For female CEOs, there is also a small share of family-related answers with negative connotation, but the vast majority remains positively associated. This is again particularly true for the trade-off treatment 3F: 14 percent of answers mention family-related words with a positive connotation compared to 6 and 7 percent in groups 2M and 2F respectively. This is in line with a positive view of a female CEO having successfully combined a career and care responsibilities and her being perceived as particularly positively selected.[48]

Figure 19: Sentiment of gender and family words in reasoning on Glassdoor Approval



(a) gender (b) family

Notes: Shares of answers mentioning gender and family in positive or negative or both positive and negative ways for question on reasons for Glassdoor approval by treatment group.

[47] Some words, like *gender quota* without any further context, cannot be categorized as positive or negative and will hence be missing from the count.

[48] The sentiment in answers to the question about CEO 'survival' are very much aligned with the expected 'survival' of the CEO in the firm (Figures A.9 and A.10). Overall, answers tend to be harder to categorize into positive and negative connotations, but those who are mention gender and family positively for expected 'survival' (panel a) and negatively for expected 'no-survival' (panel b).

3.3.3 Heterogeneous treatment effects

Heterogeneity by respondent gender

Given the focus of our study on gender and family, we assess whether female and male particpants respond differently to the stereotypical coverage of CEOs in newspapers. This may be the case if female and male respondents differ in their gender norms, or in their exposure to women in leadership positions. In fact, both of this is true in our sample: female respondents are significantly more likely to have a female CEO (29.5 percent, vs 9.8 percent of men) and they are more strongly in favor of more women in leadership positions than men (although they already believe more CEOs of German DAX-40 companies to be female compared to men). Hence, female respondents in our sample are both more exposed to female leadership and they hold more progressive gender norms in this regard.

Table 13: Treatment effects on investment in stock of PHARMA AG, by gender

	Outcome: investment into stock of PHARMA AG (in EUR)					
	(1)	(2)	(3)	(4)	(5)	(6)
		Men			Women	
Baseline mean (1M):	50.80EUR			55.80EUR		
2M - family neutral	2.665	3.041	3.041	-0.426	-1.098	-1.132
	(2.179)	(2.187)	(2.197)	(2.024)	(2.031)	(2.022)
1F - no family	0.409	0.250	-0.111	0.097	0.219	0.096
	(2.122)	(2.116)	(2.098)	(1.959)	(2.010)	(2.007)
2F - family neutral	-2.904	-2.763	-2.519	-3.926**	-4.300**	-4.533**
	(2.184)	(2.179)	(2.173)	(1.946)	(1.953)	(1.951)
p-value 2F-2M:	[0.013**]	[0.009**]	[0.013**]	[0.091*]	[0.114]	[0.092*]
p-value 2F-1F:	[0.128]	[0.163]	[0.262]	[0.045**]	[0.023**]	[0.020**]
p-value 2F-3F:	[0.033**]	[0.038**]	[0.063*]	[0.019**]	[0.027**]	[0.018**]
p-value 2F-3M:	[0.313]	[0.307]	[0.438]	[0.184]	[0.121]	[0.087*]
3F - family trade-off	1.756	1.782	1.558	0.859	0.205	0.296
	(2.127)	(2.137)	(2.141)	(2.002)	(2.034)	(2.039)
3M - family trade-off	-0.478	-0.269	-0.626	-1.013	-0.966	-0.868
	(2.353)	(2.409)	(2.414)	(2.148)	(2.173)	(2.164)
Control for individual demographics	No	Yes	Yes	No	Yes	Yes
Further study controls	No	No	Yes	No	No	Yes
R-squared	0.005	0.046	0.057	0.004	0.043	0.053
N	1,653	1,653	1,653	1,564	1,564	1,564

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Notes: Results of regression of incentivized outcome 2 (investment in stock of PHARMA AG compared to DAX ETF out of €100) on treatment group dummies and control variables, by gender. Standard errors in parenthesis, *p <0.10, **p<0.05, ***p<0.01.

Different gender norms across female and male respondents also translate into gender differences in their investment behavior. Table 13 shows the main results from Table A.11 separately by participant gender. Even though women in our sample are significantly more risk-averse than men, they invest significantly more in the stock of PHARMA AG compared

to the theoretically less volatile DAX ETF in the baseline (1M). Both genders invest less in the stock when the family is mentioned neutrally for a female CEO (2F), especially compared to the neutral family mention for a male CEO (2M). The difference is larger in magnitude for female respondents compared to the baseline treatment (1M), but the absolute difference compared to 2M is larger for men. Men assign an investment bonus to female CEOs with a successful management of a family-career trade-off (3F), in particular compared to the neutral mention (p values between 0.03 and 0.06). Female respondents invest less in the female-led firm with a neutrally mentioned family, both compared to no family mention and when a successful trade-off is highlighted.

Table 14: Treatment effects on beliefs about CEO approval of employees, by gender

	Outcome: expected share of employees approving of CEO					
	(1)	(2)	(3)	(4)	(5)	(6)
		Men			Women	
Baseline mean (1M):	64.04%			62.89%		
2M - family neutral	1.506	1.417	1.367	0.798	0.387	0.344
	(1.567)	(1.545)	(1.544)	(1.623)	(1.623)	(1.583)
1F - no family	-0.011	-0.372	-0.521	-1.168	-1.932	-2.295
	(1.591)	(1.564)	(1.552)	(1.640)	(1.593)	(1.558)
2F - family neutral	0.980	1.062	1.104	-1.499	-2.119	-2.390
	(1.539)	(1.535)	(1.508)	(1.564)	(1.498)	(1.483)
p-value 2F-2M:	[0.743]	[0.824]	[0.866]	[0.160]	[0.116]	[0.083*]
3F - family trade-off	2.802*	2.346	2.246	-2.218	-3.458**	-3.416**
	(1.442)	(1.432)	(1.424)	(1.706)	(1.661)	(1.610)
p-value 3F-1F:	[0.068*]	[0.074*]	[0.062*]	[0.556]	[0.377]	[0.499]
p-value 3F-2M:	[0.393]	[0.533]	[0.548]	[0.088*]	[0.028**]	[0.026**]
p-value 3F-3M:	[0.218]	[0.659]	[0.498]	[0.196]	[0.112]	[0.095*]
3M - family trade-off	0.779	1.610	1.126	0.143	-0.591	-0.499
	(1.690)	(1.705)	(1.721)	(1.685)	(1.672)	(1.646)
Control for individual demographics	No	Yes	Yes	No	Yes	Yes
Further study controls	No	No	Yes	No	No	Yes
R-squared	0.003	0.066	0.112	0.003	0.086	0.138
N	1,765	1,765	1,765	1,698	1,698	1,698

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Notes: Results of regression of incentivized outcome 3 (beliefs about CEO approval by employees on Glassdoor) on treatment group dummies and control variables, by gender. Standard errors in parenthesis, *p <0.10, **p<0.05, ***p<0.01.

Female and male participants also have different expectations around a CEO's employee approval on Glassdoor. This is especially striking for the treatment that highlights the trade-off between family and career for a female CEO (3F, see Table 14). Male participants positively value a successful management of career and family when considering employee satisfaction, compared to both female (1F) and male CEOs (1M, baseline) without the family being mentioned. Female respondents are generally more pessimistic about employees' rating of female

CEOs, in particular compared to male CEOs with a neutral family mention (2M).

Heterogeneity by respondent parental status

Equivalently to respondent gender, the focus of the articles on family also suggests a potentially different reaction of parents and non-parents to the treatments. We identify the parental status of participants through a question asking them about the composition of their household. More precisely, we ask them to give us the number of all female, male, or non-binary members currently living in their household, both below the age of 18 and above. A respondent is considered a parent if there is at least one person below the age of 18 in the household. Although this may include non-biological children and may exclude children that do not live with their parents (anymore), we are mostly after the exposure to care responsibilities which should be concentrated in the presence of children living in the household. Around 30 percent of respondents ($n = 1053$) are classified as parents following this definition.[49]

Table 15: Treatment effects on investment in stock of PHARMA AG, by parental status

	Outcome: investment into stock of PHARMA AG (in EUR)					
	(1)	(2)	(3)	(4)	(5)	(6)
	Childless			Parents		
Baseline mean (1M):	52.07EUR			55.75EUR		
2M - family neutral	2.221	1.724	1.646	-1.138	-1.369	-1.614
	(1.815)	(1.812)	(1.806)	(2.599)	(2.614)	(2.628)
1F - no family	1.086	0.961	0.744	-1.257	-1.165	-1.245
	(1.753)	(1.752)	(1.736)	(2.582)	(2.629)	(2.619)
2F - family neutral	-1.361	-1.688	-1.737	-7.892***	-7.548***	-7.520***
	(1.801)	(1.779)	(1.779)	(2.506)	(2.570)	(2.561)
p-value 2F-2M:	[0.057*]	[0.068*]	[0.070*]	[0.009***]	[0.018**]	[0.024**]
p-value 2F-1F:	[0.179]	[0.141]	[0.166]	[0.010**]	[0.014**]	[0.016**]
p-value 2F-3F:	[0.039**]	[0.038**]	[0.036**]	[0.019**]	[0.023**]	[0.024**]
p-value 2F-3M:	[0.447]	[0.398]	[0.369]	[0.054*]	[0.026**]	[0.043**]
3F - family trade-off	2.396	2.037	2.042	-1.659	-1.475	-1.509
	(1.750)	(1.734)	(1.738)	(2.660)	(2.702)	(2.694)
3M - family trade-off	0.187	0.036	0.085	-2.696	-1.414	-1.867
	(1.977)	(1.991)	(1.978)	(2.711)	(2.751)	(2.784)
Control for individual demographics	No	Yes	Yes	No	Yes	Yes
Further study controls	No	No	Yes	No	No	Yes
R-squared	0.003	0.050	0.060	0.012	0.055	0.064
N	2,250	2,250	2,250	979	979	979

Standard errors in parentheses

* $p < 0.10$,** $p < 0.05$,*** $p < 0.01$

Notes: Results of regression of incentivized outcome 2 (investment in stock of PHARMA AG compared to DAX ETF out of €100) on treatment group dummies and control variables, by parental status of respondents. Standard errors in parenthesis, *p <0.10, **p<0.05, ***p<0.01.

[49]The median number of children reported among parents is 1 while the average is 1.62, and this comes similarly from female and male children.

Table 16: Treatment effects on beliefs about employee approval, by parental status

	Outcome: expected share of employees approving of CEO					
	(1)	(2)	(3)	(4)	(5)	(6)
	Childless			Parents		
Baseline mean (1M):	64.37%			61.53%		
2M - family neutral	0.504	-0.242	-0.221	2.555	3.190	3.158
	(1.328)	(1.329)	(1.318)	(2.100)	(2.060)	(2.041)
1F - no family	-1.772	-2.428*	-2.680**	2.269	2.175	2.065
	(1.363)	(1.345)	(1.319)	(2.068)	(1.995)	(1.988)
2F - family neutral	-0.300	-0.366	-0.489	-0.194	-0.399	-0.108
	(1.309)	(1.297)	(1.286)	(1.978)	(1.902)	(1.860)
p-value 2M-2F:	[0.557]	[0.927]	[0.841]	[0.192]	[0.081*]	[0.103]
p-value 3M-2F:	[0.677]	[0.521]	[0.513]	[0.084*]	[0.012**]	[0.022**]
3F - family trade-off	-0.263	-0.907	-0.881	1.505	0.862	1.096
	(1.284)	(1.265)	(1.239)	(2.226)	(2.164)	(2.150)
3M - family trade-off	-0.924	-1.314	-1.446	3.342	4.910**	4.657**
	(1.466)	(1.447)	(1.453)	(2.041)	(2.072)	(2.075)
Control for individual demographics	No	Yes	Yes	No	Yes	Yes
Further study controls	No	No	Yes	No	No	Yes
R-squared	0.001	0.064	0.113	0.004	0.109	0.151
N	2,423	2,423	2,423	1,053	1,053	1,053

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Notes: Results of regression of incentivized outcome 3 (beliefs about CEO approval by employees on Glassdoor) on treatment group dummies and control variables, by parental status of respondents. Standard errors in parenthesis, *p <0.10, **p<0.05, ***p<0.01.

As for gender, respondents take very different decisions depending on their parental status. Parents and childless respondents already invest differently in the baseline treatment (1M) with parents allocating a larger share of their endowment to the stock of PHARMA AG. This is again in contrast to parents being significantly more risk-averse in the overall sample. Parents tend to evaluate both a male CEO with family mention and all female CEOs worse than the baseline male CEO without family mention (1M), although only significantly so for a female CEO with neutral family coverage (2F, Table 15). The latter group is also punished most compared to all other treatment groups with parents investing almost 8€ less into the stock of PHARMA AG when presented with the corresponding treatment article. This implies that parents anticipate care responsibilites for CEOs that are parents, both for male CEOs when the family is mentioned, and, in particular, for female CEOs across both family groups. For childless participants, the comparison to the baseline group (1M) seems to be less important, although they seem to invest slightly more when there is a male CEO whose family is neutrally mentioned (2M). This is particularly true compared to a female CEO with neutral family mention (2F). Most strikingly, childless individuals assign a premium to female CEOs with a family when it is highlighted that they successfully managed the trade-off between career and

family (3F). Hence, childless individuals seem to particularly believe in positive selection of the female CEO in treatment 3F (and less so for 3M highlighting a family-career trade-off for male CEOs).

Parents also assess employee satisfaction differently from non-parents. In particular, parents expect higher employee ratings for male CEOs with a family (2M), for female CEOs without family mention (1F), an for both female (3F) and especially male (3M) CEOs with successful management of a family-career trade-off compared to the baseline (1M). Instead, for female CEOs with neutral mention of their family (2F), parents expect lower employee ratings, especially compared to a male CEO with either family mention (2M an 3M). Hence, parents seem to think that male CEOs are more popular with employees if they are parents or have even "raised children" whereas they expect employees to punish females in a similar situation. Instead, childless respondents generally assume that employees rate female CEOs worse, in particular if no family is mentioned (1F), but also for male CEOs where a family-career trade-off has been highlighted. This suggests that childless respondents are skeptical about employee satisfaction with a female CEO (all treatments but especially with no family mention) but also of male CEOs with a family compared to the baseline (1M).

4 Conclusion

This paper documents gender stereotypes in the media coverage of female and male company leaders and shows that these stereotypes matter for the perception of leaders and their companies among readers.

The first part of the paper presents initial evidence on gender differences and stereotypes in the newspaper coverage of company board members using quantitative text analysis. We first show that articles about female corporate leaders are more often related to concepts of gender, family, and social interactions while terms associated with power and competition as well as failure, scandals, and adversity are more prevalent for men. These patterns are related to the well-known concepts of agency and communion from psychology. Using data from the German Socio-Economic Panel, we also show that women in managerial roles are *less* often married and *less often* have children compared to male managers and compared to the general population. There is also no strong evidence for gender differences in self-perception of agency and communion among managers. As there is no clear reduction of stereotypes over time, we also mildly reject information asymmetries among journalists as the main driver of the stereotypical representation. Thus, the gender differences in newspaper coverage of company board members to a large extent do not seem to be founded on actual differences in characteristics of women and men in these positions and do not diminish with increased exposure to female board members, providing little support for an explanation based on statistical discrimination.

The second part of the paper investigates how stereotypical newspaper coverage of male and female CEOs affects readers' economic decision-making and their assessment of CEO

competence. In an incentivized online experiment, we vary whether and how the family of a CEO is mentioned in a newspaper article, either not at all, neutrally, or in the framework of a trade-off between career and family. We find that expected firm performance differs substantially by CEO gender with participants being less likely to believe in better stock performance in the year after compared to the year before CEO appointment for female CEOs. Further, respondents invest substantially less in the stock of the firm when there is a female CEO whose family is neutrally mentioned but not when highlighting the successful management of family and career as a trade-off. Considerations about family and gender play a role in respondents' reasoning, and treatment effects are most pronounced for female respondents and parents. There is no effect of stereotypical coverage on CEO 'survival' but female respondents expect female CEOs to be rated worse by their employees, in particular for the treatment highlighting a trade-off between family and career. Male participants perceive an employee bonus for female CEOs in the trade-off treatment compared to female CEOs without a family mention. Heterogeneities by gender may be driven by differences in exposure to and gender norms regarding women in leadership positions.

Our results highlight the importance of media coverage in shaping readers' perceptions and economic decisions, especially since gendered and stereotypical portrayal of CEOs is widespread in German media as we show in the first part of the paper. Given that nearly 65 percent of the participants in our experiment report reading online or offline newspapers at least once per week, and 43 percent state they have stock market investment experience, the stereotypical representation of CEOs could potentially have a significant impact on stock investments and, consequently, stock market equilibria. Furthermore, the more pessimistic expectations towards firms led by female CEOs may present an additional barrier to women's representation in leadership positions. Policies should take these media-driven effects into account when aiming to create a level playing field for women and men to reach leadership positions. Further, policies can incentivize counter-stereotypical behavior, such as a more gender-equal distribution of caregiving responsibilities, ultimately helping to reduce gender stereotypes over time.

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A Appendix

A.1 Additional figures and tables

Figure A.1: Example of selection of relevant sentences on board members using search terms

Das Wachstumswunder aus dem Westerwald

Ralph Dommermuth ist ein Mann für kurze Sätze. Das erfährt jeder, der mit dem Vorstandsvorsitzenden der United Internet AG spricht. Zum Thema Internetempfang über das Mobiltelefon sagte Dommermuth dieser Zeitung zum Beispiel lediglich: "Das wird kommen. Wenn der Markt entsteht, wollen wir dabei sein." In welcher Form Dommermuths Internetunternehmen aus Montabaur im Westerwald an diesem Geschäft teilhaben könnte, umriss der Manager ebenso prägnant. "Ein Ansatzpunkt für uns wäre der ‚Blackberry für jedermann'. Wir sind aber noch in der Evaluierungsphase." Zehn Jahre ist es nun her, dass der inzwischen 52 Jahre alte Dommermuth die Chancen für einen Erfolg im mobilen Internet auslotete und dabei auch Bezug auf das Gerät nahm, das den Siegeszug des Internetempfangs per Handy damals wie kein anderes verkörperte. Denn "der Blackberry" stand 2005 noch synonym für den Netzzugriff von unterwegs. Vor allem Führungskräfte und solche, die es glaubten zu sein, nutzten das Handy mit der eingebauten Druckknopftastatur und riefen darüber E-Mails ab oder Internetseiten auf. Heute ist das als süchtig machendes "Crackberry" verballhornte Gerät fast schon vergessen, und den Smartphone-Markt dominieren der amerikanische Elektronikkonzern Apple und der koreanische Konkurrent Samsung. Im dritten Quartal 2015 kam nach Angaben des Marktforschungsunternehmens Gartner jedes dritte neu verkaufte Gerät von diesen beiden Unternehmen. Blackberry ist also so gut wie weg. Doch United Internet und sein Vorstandschef Dommermuth sind noch da - und zwar stärker als je zuvor. [. . .]

The Growth Miracle from the Westerwald

Ralph Dommermuth is a man of few words. This becomes evident to anyone who speaks with the CEO of United Internet AG. When discussing internet reception via mobile phone, Dommermuth told this newspaper, "It will come. When the market emerges, we want to be part of it." Dommermuth similarly outlined how his internet company from Montabaur in the Westerwald could participate in this business. "One approach for us would be 'Blackberry for everyone.' But we are still in the evaluation phase." It has now been ten years since the now 52-year-old Dommermuth explored the potential for success in mobile internet, referencing the device that embodied internet reception via mobile phone like no other at the time. In 2005, "the Blackberry" was still synonymous with internet access on the go. Primarily executives and those aspiring to be used the phone with the built-in push-button keyboard to retrieve emails or browse the web. Today, the device, mockingly referred to as the addictive "Crackberry," is almost forgotten, and the smartphone market is dominated by American electronics giant Apple and Korean competitor Samsung. In the third quarter of 2015, according to market research firm Gartner, every third newly sold device came from these two companies. Blackberry is virtually gone. Yet, United Internet and its CEO Dommermuth are still here—and stronger than ever. [. . .]

Notes: Example of the selection of relevant sentences on board members from articles using the search terms listed in Figure A.3. The board member searched for is Ralph Dommermuth. The selected sentences are highlighted in blue. The German text in the left column is the original article, the text in the right column is the English translation using ChatGPT.

Figure A.2: Example of text preprocessing (original and English translation by ChatGPT)

Raw text:

Carla Kriwet übernimmt die Führung der Medizinfirma Fresenius Medical Care. Sie ist damit künftig eine von nur zwei Dax-Chefinnen Es war eine ziemliche Überraschung, als Carla Kriwet, 51, in der vergangenen Woche mitteilte, dass sie Europas größtem Hausgerätehersteller BSH verlassen werde, und zwar sehr plötzlich, schon zu Ende April. Kriwet war erst im Sommer 2020 – mitten in der Pandemie – Chefin des Unternehmens geworden, das mit Waschmaschinen, Kühlschränken, Herden und Küchenmaschinen der Marken Bosch, Siemens, Gaggenau und Neff einen Weltumsatz von fast 16 Milliarden Euro macht.

Preprocessed text:

übernehmen führung medizinfirma chef_in überraschung mitteilen hausgerätehersteller verlassen plötzlich pandemie chef_in unternehmen waschmaschine kühlschrank herd küchenmaschine marke weltumsatz

Raw text:

Carla Kriwet takes over the leadership of the medical company Fresenius Medical Care. She will thus become one of only two female CEOs in the DAX. It was quite a surprise when Carla Kriwet, 51, announced last week that she would be leaving Europe's largest home appliance manufacturer, BSH, very suddenly, at the end of April. Kriwet had only become the head of the company in the summer of 2020 – in the midst of the pandemic. The company, which manufactures washing machines, refrigerators, stoves, and kitchen appliances under the brands Bosch, Siemens, Gaggenau, and Neff, has a global turnover of almost 16 billion euros.

Preprocessed text:

take over leadership medical company boss surprise announce home appliance manufacturer leave suddenly pandemic boss company washing machine refrigerator stove kitchen appliance brand global turnover

Notes: Example of a raw article text (relevant sentences as selected using the search terms) and the resulting text after all preprocessing steps such as tokenization, removal of stop words, names, places, dates and organization names, and lemmatization.

Figure A.3: Snippet of the tf-idf-transformed data

name	company	position	gender	relevant_sentences_preprocessed	abbau_tfidf	abgang_tfidf	abgeben_tfidf	ablösen_tfidf	abschied_tfidf	abschließen_tfidf	aktie_tfidf	aktienkurs_tfidf	aktionär_in_tfidf
michael diekmar	allianz	VST-Vors	0	vorstandsvorsitz legen öffentlich k	0	0	0	0	0	0	0	0	0
michael diekmar	allianz	VST-Vors	0	vorstandsvorsitz beginn ungewohr	0	0	0	0	0	0	0	0	0
michael diekmar	allianz	VST-Vors	0	börsenchef nennen niedrig steuers	0	0	0	0	0	0	0	0	0
michael diekmar	allianz	VST-Vors	0	investments infrastruktur vorstelle	0	0	0	0	0	0	0	0	0
michael diekmar	allianz	VST-Vors	0	amtszeit beschreiben erfolgreich u	0	0	0	0	0	0	0	0	0,42601
michael diekmar	allianz	VST-Vors	0	fazit spitzenmanagment konzern sp	0	0	0	0	0	0	0	0	0
michael diekmar	allianz	VST-Vors	0	chef_in fluchtartig unternehmen ve	0	0	0,1664	0	0	0,17274	0	0	0
michael diekmar	allianz	VST-Vors	0	langjährig vorstandsvorsitz amtier	0	0	0	0	0	0	0	0	0
michael diekmar	allianz	VST-Vors	0	vorstandsvorsitz übergeben legen	0	0	0	0	0	0	0	0	0
michael diekmar	allianz	VST-Vors	0	chef_in helga jung frau konzernvor	0	0	0	0	0	0	0	0	0
oliver bäte	allianz	VST-Vors	0	wagen vorständ_in ausblick gesch	0	0	0	0	0	0	0	0	0
oliver bäte	allianz	VST-Vors	0	vorstandschef_in bank branche dü	0	0	0	0	0	0	0	0	0
oliver bäte	allianz	VST-Vors	0	selten ereignis wechsel vorstandss	0	0	0	0	0	0	0	0	0
oliver bäte	allianz	VST-Vors	0	schnell denken schnell sprechen s	0	0	0	0	0	0	0	0	0
oliver bäte	allianz	VST-Vors	0	spüren manager_in assekuranz ver	0	0	0	0	0	0	0	0	0
oliver bäte	allianz	VST-Vors	0	amt sprechen hochmotiviert mitar	0	0,2105	0	0	0	0	0	0	0
oliver bäte	allianz	VST-Vors	0	halten versprechen messlatte divic	0	0	0	0	0	0	0	0	0,20176
oliver bäte	allianz	VST-Vors	0	langjährig vorstandsvorsitz amtier	0	0	0	0	0	0,16568	0	0	0

Notes: Screenshot of a snippet of the articles data after preprocessing and the tf-idf transformation. The columns *name*, *company*, *gender* and *position* contain the name, company name, gender and board position of the person refereed to in the article. The column *relevant_sentences_preprocessed* contains the preprocessed text of each article. All columns with a *tfidf*-suffix are the $T \times D$ tf-idf matrix and each column contain the tf-idf of the respective term.

Figure A.4: Average number of children in the household conditional on having children in general population and samples of managers



Notes: Average number of children in the household among individuals that have at least one child in the household by year in the whole sample of the German SOEP and in subsamples of managers identified by the SOEP survey question whether the individual in their job is in a leadership position or using the 4th digit of the KldB 2010 Classification of Occupations.

Figure A.5: Translation of article text group 1F - female CEO and no information on family

Business

Leadership change at PHARMA AG: Martina Bauer appointed new CEO

At the beginning of next week, Martina Bauer will become the new Chairwoman of the Management Board at Oberdorfer Group PHARMA AG. The change is taking place as planned, according to information from Oberdorf. It was already in the air when Bauer was appointed Deputy Chairwoman of the Management Board last year.

PHARMA AG is one of the largest publicly traded companies in Germany. It was founded more than 350 years ago by Ludwig Maier. To this day, the company remains majority family-owned. PHARMA AG is divided into the business sectors of Healthcare, Life Science, and Performance Materials, and employs staff in more than 60 countries. Currently, PHARMA AG is working on the production of antibodies and proteins for the treatment of various types of cancer, as well as on high-tech laboratory equipment for the biopharmaceutical industry.

Martina Bauer studied and completed her doctorate in a sub-field of medicine. She climbed the career ladder at an international pharmaceutical company before joining PHARMA AG a few years ago. As the head of the Healthcare division, which develops patented medicines, she has been a member of the PHARMA AG executive board for several years.

Notes: English translation (using ChatGPT) of article shown to participants in treatment group with a female CEO and no family mention (1F). The original German text can be found in Figure A.16.

Figure A.6: Translation of article text group 2M - male CEO and information on family

Business

Leadership change at PHARMA AG: Martin Bauer appointed new CEO

At the beginning of next week, Martin Bauer will become the new Chairman of the Management Board at Oberdorfer Group PHARMA AG. The change is taking place as planned, according to information from Oberdorf. It was already in the air when Bauer was appointed Deputy Chairman of the Management Board last year.

PHARMA AG is one of the largest publicly traded companies in Germany. It was founded more than 350 years ago by Ludwig Maier. To this day, the company remains majority family-owned. PHARMA AG is divided into the business sectors of Healthcare, Life Science, and Performance Materials, and employs staff in more than 60 countries. Currently, PHARMA AG is working on the production of antibodies and proteins for the treatment of various types of cancer, as well as on high-tech laboratory equipment for the biopharmaceutical industry.

Martin Bauer studied and completed his doctorate in a sub-field of medicine. He climbed the career ladder at an international pharmaceutical company before joining PHARMA AG a few years ago. As the head of the Healthcare division, which develops patented medicines, he has been a member of the PHARMA AG executive board for several years. Bauer is married and father of two children.

Notes: English translation (using ChatGPT) of article shown to participants in treatment group 2M. The original German text can be found in Figure A.17.

Figure A.7: Translation of article text group 3M - male CEO and information on family-career trade-off

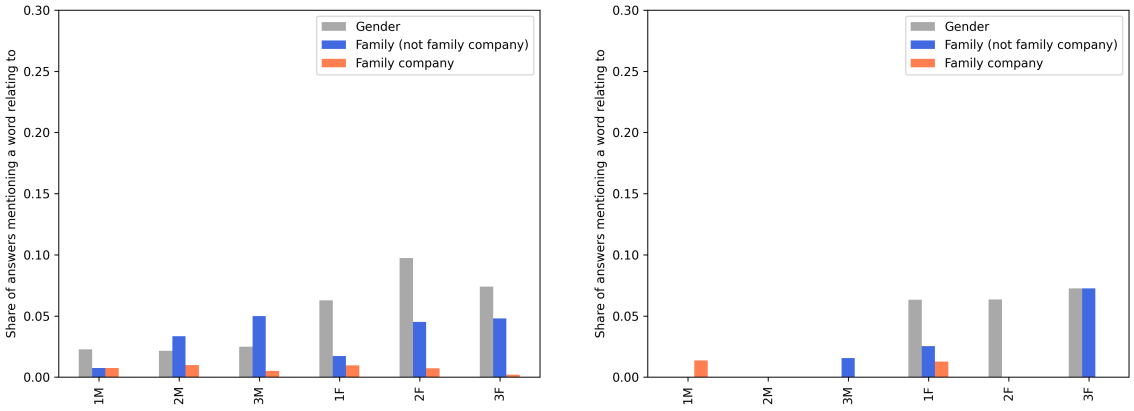
Business

Leadership change at PHARMA AG: Martin Bauer appointed new CEO

At the beginning of next week, Martin Bauer will become the new Chairman of the Management Board at Oberdorfer Group PHARMA AG. The change is taking place as planned, according to information from Oberdorf. It was already in the air when Bauer was appointed Deputy Chairman of the Management Board last year.
PHARMA AG is one of the largest publicly traded companies in Germany. It was founded more than 350 years ago by Ludwig Maier. To this day, the company remains majority family-owned. PHARMA AG is divided into the business sectors of Healthcare, Life Science, and Performance Materials, and employs staff in more than 60 countries. Currently, PHARMA AG is working on the production of antibodies and proteins for the treatment of various types of cancer, as well as on high-tech laboratory equipment for the biopharmaceutical industry.
Martin Bauer studied and completed his doctorate in a sub-field of medicine. He climbed the career ladder at an international pharmaceutical company before joining PHARMA AG a few years ago. As the head of the Healthcare division, which develops patented medicines, he has been a member of the PHARMA AG executive board for several years. He has raised two children and still managed to have a successful career.

Notes: English translation (using ChatGPT) of article shown to participants in treatment group with a male CEO and mentioning of family and career trade-off (3M). The original German text can be found in Figure A.20.

Figure A.8: Mentioning of gender and family words in reasoning on CEO 'survival'

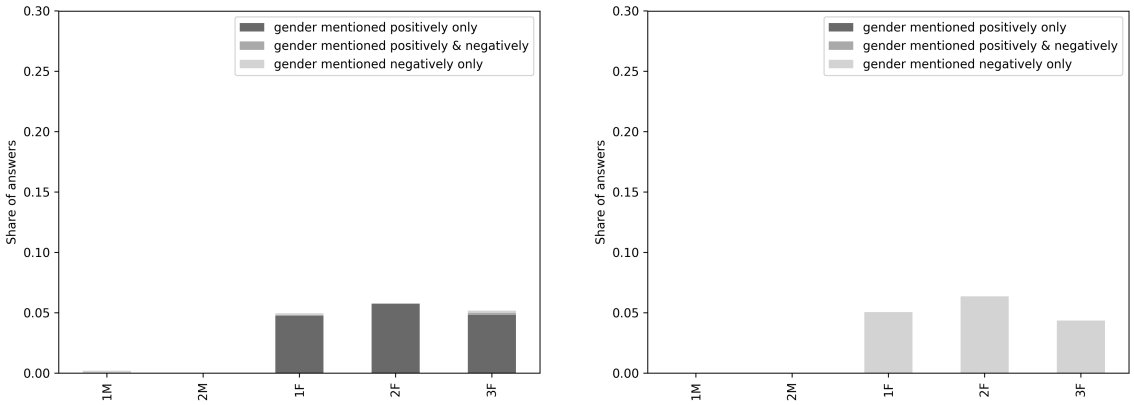


(a) CEO still in place after two years

(b) CEO not in place anymore after two years

Notes: Shares of answers mentioning at least one term related to gender, family or PHARMA AG as family-owned business for questions on reasons for believed CEO 'survival' or 'no-survival' by treatment group.

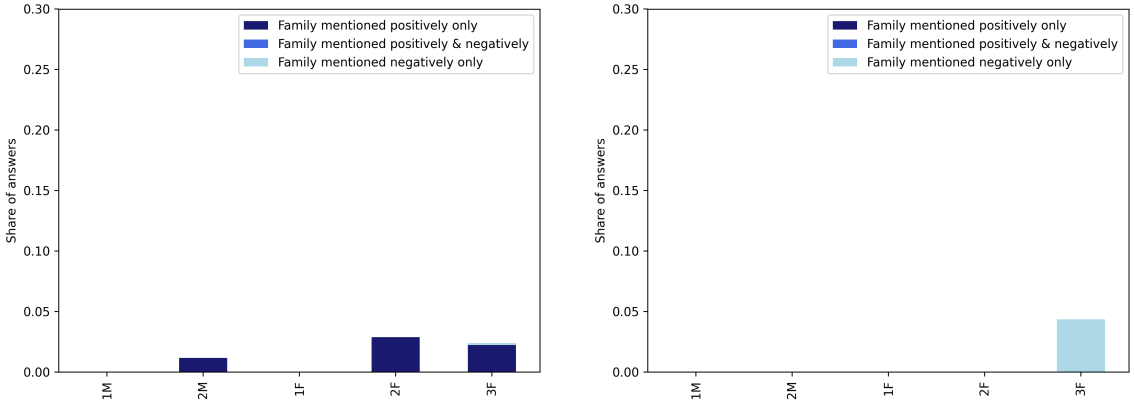
Figure A.9: Sentiment of gender words in reasoning on CEO 'survival



(a) CEO still in place after two years (b) CEO not in place anymore after two years

Notes: Shares of answers mentioning gender in positive or negative or both positive and negative ways for questions on reasons about expected CEO 'survival' or 'no-survival' by treatment group.

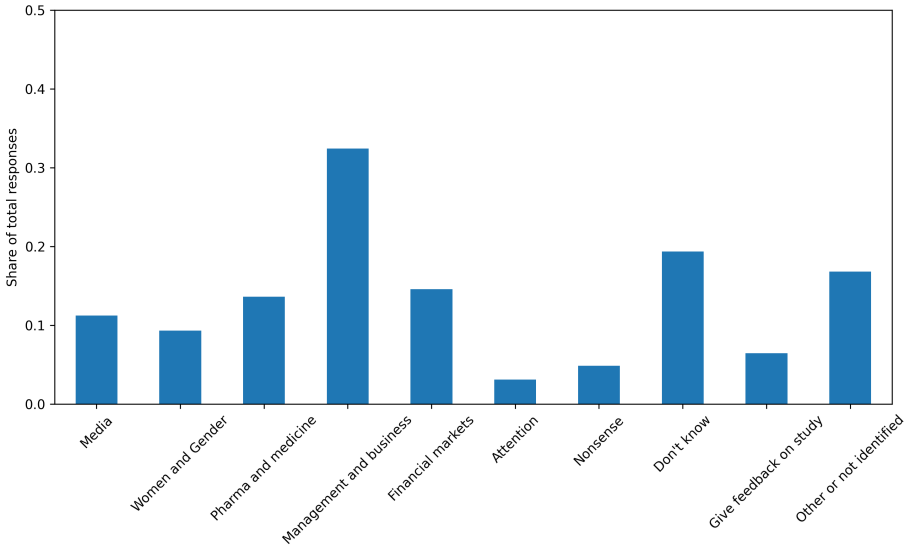
Figure A.10: Sentiment of family words in reasoning on CEO 'survival



(a) CEO still in place after two years (b) CEO not in place anymore after two years

Notes: Shares of answers mentioning family in positive or negative or both positive and negative ways for questions on reasons about expected CEO 'survival' or 'no-survival' by treatment group.

Figure A.11: Guesses for topic of the study



Notes: Shares of answers mentioning terms related to different topics in question on beliefs about study topic. An answer can mention terms related to several of these topics, therefore shares do not add up to one.

Table A.1: Cronbach's alpha of agency and communion scales

	Cronbach's Alpha
Agency - self-evaluation	0.77
Agency - personal importance	0.81
Communion - self-evaluation	0.84
Communion - personal importance	0.91

Notes: Cronbach's alpha of agency and communion scales measured in the SOEP-IS data. Items considered for agency are *cleverness*, *competence*, *ability*, and *influence*. Items considered for communion are *warmth*, *helpfulness*, *empathy*, and *caringness*. Separate scales for self-evaluation and personal importance are considered.

Table A.2: Numbers of observations of board members and articles - whole dataset vs. random 10 percent sample of articles on men

	Executive chairs		Supervisory chairs		Executive members	Combined
	Total	10% articles on men	Total	10% articles on men	Total	Using 10% articles on men
Men	373	264	260	146		399
Women	15	15	13	13	111	127
Total - persons	388	279	273	159	111	526
Articles men	35,149	3,488	11,860	1,137		4,608
Articles women	632	632	360	360	2,187	2,712
Total - articles	35,781	4,120	12,220	1,497	2,187	7,320

Notes: Numbers of observations of board members and newspaper articles in the dataset by position and gender for the total sample of articles as well as taking a random sample of 10 percent of articles on men.

Table A.3: German list of search terms to select relevant sentences from each article

	Man	**Woman**
Executive board chair	first and last names, *er*, *ihm*, *ihn*, *der/den/dem vorstandsvorsitzende/n*, *CEO*, *geschäftsführer/s*, *chef/s* , *boss*, *spitze*, *manager/s*	first and last names, *sie*, *ihr*, *die/der vorstandsvorsitzende/n*, *CEO*, *geschäftsführerin*, *chefin*, *sprecherin*, *spitze*, *managerin*
Supervisory board chair	first and last names, *er*, *ihm*, *ihn*, *der/den aufsichtsratsvorsitzende/n*, *der vorsitzende*, *chefkontrolleur*, *chefaufseher*, *sprecher*, *aufsichtsratschef/s*, *chef des aufsichtsrats*, *boss des aufsichtsrats*, *aufsichtsratsboss*	first and last names, *sie*, *ihr*, *die/der aufsichtsratsvorsitzende/n*, *die vorsitzende*, *bossin*, *chefkontrolleurin*, *chefaufseherin*, *aufsichtsratschefin*, *sprecherin*, *chefin des aufsichtsrats*
Executive board member		first and last names, *sie*, *ihr*, *vorständin*, *chefin*, *managerin*

Notes: Lists of search terms that are used to select the relevant sentences that refer to a certain board member in an article by position and gender.

Table A.4: Cosine similarity of gender and career/family dimensions using the five and 15 most common terms

	Five Terms	15 Terms
Supervisory chairs	0.28	0.31
Executive chairs	0.22	0.10
Executive and supervisory chairs and executive board women	0.27	0.11

Notes: Cosine similarities of the vectors capturing the gender dimension ($\overrightarrow{mf}$) and the career/-family dimension ($\overrightarrow{cf}$) based on the five and 15 most common terms using word embeddings trained on articles referring to different groups of board members. A positive cosine similarity indicates that an association of male terms with career terms and of female terms with family terms.

Table A.5: Cosine similarity of gender and career/family dimensions using a vector size of 300

Supervisory chairs	0.29
Executive chairs	0.10
Executive and supervisory chairs and executive board women	0.12

Notes: Cosine similarities of the vectors capturing the gender dimension ($\overrightarrow{mf}$) and the career/-family dimension ($\overrightarrow{cf}$) using word embeddings trained on articles referring to different groups of board members using a vector size of 300. A positive cosine similarity indicates that an association of male terms with career terms and of female terms with family terms.

Table A.6: Average normalized word counts of agency and communion terms in articles by gender

(a) Supervisory and executive board chairs and executive board women

	Men	Women	Difference	Difference in percent
Agency	3.530	3.073	-0.457***	-14.9
Communion	5.654	6.385	0.730***	11.4
Observations	48,452			

(b) Supervisory board chairs

	Men	Women	Difference	Difference in percent
Agency	3.553	3.041	-0.512*	-16.9
Communion	5.969	7.619	1.650***	21.7
Observations	12,216			

(c) Executive board chairs

	Men	Women	Difference	Difference in percent
Agency	3.533	3.221	-0.312	-9.7
Communion	5.527	5.918	0.391*	6.6
Observations	35,773			

Notes: Average sum of agency and communion terms per 100 words in articles referring to male or female board members in the entire dataset and subsamples of supervisory and executive board chairs.

Table A.7: Demographics of survey sample

	(1) Obs.	(2) Mean	(3) Median	(4) Std. Dev.	(5) Min.	(6) Max.
Employment status:						
Full-time employed	3,476	0.45	0.00	0.50	0	1
Part-time employed	3,476	0.16	0.00	0.37	0	1
Self-employed	3,476	0.04	0.00	0.20	0	1
Unemployed	3,476	0.06	0.00	0.24	0	1
Irregularly employed	3,476	0.01	0.00	0.11	0	1
Retired	3,476	0.16	0.00	0.36	0	1
Student/apprentice	3,476	0.07	0.00	0.25	0	1
Other	3,476	0.05	0.00	0.22	0	1
Household members <18:						
Male	3,476	0.23	0.00	0.52	0	4
Female	3,476	0.26	0.00	0.61	0	10
Diverse	3,476	0.01	0.00	0.16	0	8
Household members >=18:						
Male	3,476	0.91	1.00	0.88	0	33
Female	3,476	0.96	1.00	1.48	0	77
Diverse	3,476	0.02	0.00	0.23	0	9
Household income:						
<1000 EUR	3,476	0.09	0.00	0.28	0	1
1000-2000 EUR	3,476	0.23	0.00	0.42	0	1
2000-3000 EUR	3,476	0.27	0.00	0.44	0	1
3000-4000 EUR	3,476	0.21	0.00	0.40	0	1
>4000 EUR	3,476	0.21	0.00	0.41	0	1

Notes: Descriptive statistics on demographic variables. Balancing checks by treatment group on these variables can be found in Table A.8.

Table A.8: Balancing checks for demographics and study-related characteristics used as control variables

Variable	(1) 1M	(2) 2M	(3) 1F	(4) 2F	(5) 3F	(6) 3M	(7) 2M vs 1M	(8) 3M vs 1M	(9) 1F vs 1M	(10) 2F vs 1M	(11) 3F vs 1M
Gender:											
Male	0.503	0.513	0.513	0.494	0.516	0.508	0.010	0.004	0.010	-0.010	0.013
Female	0.488	0.487	0.485	0.503	0.477	0.490	-0.001	0.002	-0.003	0.015	-0.011
Diverse/Non-binary	0.007	0.000	0.002	0.003	0.007	0.002	-0.007*	-0.004	-0.005	-0.003	-0.000
Prefer not to answer	0.002	0.000	0.000	0.000	0.000	0.000	-0.002	-0.002	-0.002	-0.002	-0.002
Age:											
18-29	0.227	0.184	0.205	0.212	0.170	0.200	-0.042*	-0.027	-0.022	-0.015	-0.056**
30-39	0.184	0.186	0.192	0.202	0.189	0.189	0.002	0.005	0.008	0.018	0.005
40-49	0.162	0.193	0.192	0.188	0.166	0.181	0.031	0.018	0.030	0.025	0.003
50-59	0.242	0.231	0.215	0.207	0.251	0.230	-0.010	-0.012	-0.026	-0.035	0.009
60-69	0.185	0.205	0.195	0.191	0.225	0.200	0.020	0.015	0.010	0.006	0.039*
Education:											
No school leaving certificate	0.007	0.005	0.002	0.006	0.005	0.022	-0.001	0.015**	-0.005	-0.000	-0.002
Hauptschule without vocational education	0.086	0.096	0.075	0.087	0.085	0.088	0.010	0.002	-0.012	0.001	-0.001
Hauptschule with vocational education	0.137	0.167	0.169	0.168	0.157	0.140	0.030	0.002	0.031	0.031	0.020
Realschule without	0.348	0.329	0.329	0.317	0.328	0.323	-0.019	-0.025	-0.018	-0.031	-0.020
Abitur without tertiary degree	0.374	0.351	0.356	0.364	0.377	0.163	-0.023	-0.211***	-0.018	-0.010	0.003
Tertiary (e.g. university) degree	0.048	0.052	0.066	0.053	0.043	0.256	0.004	0.208***	0.018	0.005	-0.005
Other	0.000	0.000	0.003	0.003	0.005	0.009	0.000	0.009**	0.003	0.003	0.005*
Employment status:											
Full-time employed	0.449	0.431	0.462	0.447	0.485	0.452	-0.017	0.003	0.013	-0.002	0.037
Part-time employed	0.141	0.172	0.172	0.178	0.131	0.166	0.031	0.025	0.031	0.037*	-0.010
Self-employed	0.036	0.042	0.041	0.042	0.033	0.049	0.005	0.013	0.005	0.006	-0.004
Unemployed	0.058	0.066	0.046	0.066	0.052	0.071	0.008	0.013	-0.012	0.008	-0.005
Irregularly employed	0.013	0.009	0.005	0.016	0.011	0.015	-0.005	0.002	-0.008	0.003	-0.002
Retired	0.171	0.174	0.149	0.129	0.166	0.153	0.003	-0.018	-0.022	-0.041**	-0.005
Student/apprentice	0.075	0.061	0.084	0.071	0.062	0.039	-0.014	-0.036**	0.010	-0.003	-0.012
Other	0.058	0.045	0.040	0.050	0.059	0.056	-0.013	-0.002	-0.018	-0.008	0.001
Household members <18:											
Male	0.225	0.219	0.268	0.228	0.202	0.234	-0.006	0.009	0.043	0.003	-0.024
Female	0.263	0.242	0.253	0.278	0.195	0.323	-0.022	0.059	-0.010	0.015	-0.068**
Diverse	0.015	0.000	0.005	0.002	0.003	0.017	-0.015	0.002	-0.010	-0.013	-0.012
Household members >=18:											
Male	0.954	0.960	0.904	0.867	0.898	0.849	0.006	-0.104**	-0.050	-0.086**	-0.055
Female	0.902	1.071	0.950	0.911	0.949	0.957	0.169	0.055	0.048	0.009	0.047
Diverse	0.025	0.009	0.008	0.011	0.011	0.041	-0.016	0.016	-0.017	-0.014	-0.013
Household income:											
<1000 EUR	0.078	0.083	0.088	0.099	0.072	0.105	0.006	0.028	0.010	0.021	-0.006
1000-2000 EUR	0.257	0.226	0.212	0.218	0.241	0.224	-0.031	-0.033	-0.045*	-0.038	-0.016
2000-3000 EUR	0.270	0.282	0.258	0.275	0.269	0.241	0.012	-0.029	-0.012	0.005	-0.001
3000-4000 EUR	0.167	0.200	0.222	0.218	0.207	0.230	0.033	0.063***	0.055**	0.051**	0.039*
>4000 EUR	0.228	0.209	0.220	0.189	0.211	0.200	-0.020	-0.028	-0.008	-0.039*	-0.017
Frequency newspaper reading:											
<once/month	0.204	0.170	0.162	0.223	0.169	0.181	-0.033	-0.023	-0.041*	0.020	-0.035
approx. once/month	0.053	0.038	0.060	0.049	0.049	0.049	-0.015	-0.004	0.007	-0.004	-0.004
several times/month	0.124	0.118	0.121	0.134	0.102	0.118	-0.006	-0.006	-0.003	0.010	-0.023
at least once/week	0.263	0.290	0.248	0.273	0.274	0.277	0.027	0.014	-0.015	0.010	0.011
daily	0.356	0.383	0.409	0.320	0.407	0.374	0.027	0.018	0.053*	-0.036	0.051*
Risk aversion:											
very willing to take risks	0.022	0.028	0.023	0.037	0.016	0.043	0.006	0.021**	0.002	0.016	-0.005
rather willing to take risks	0.215	0.170	0.204	0.202	0.208	0.172	-0.045*	-0.043*	-0.012	-0.013	-0.007
riskneutral	0.306	0.374	0.377	0.325	0.382	0.353	0.068**	0.046	0.071***	0.019	0.076***
rather not willing to take risks	0.313	0.303	0.273	0.296	0.267	0.284	-0.010	-0.029	-0.040	-0.017	-0.046*
not willing to take risks at all	0.144	0.125	0.123	0.139	0.126	0.148	-0.019	0.004	-0.022	-0.005	-0.018
Experience investing:											
No	0.555	0.572	0.541	0.539	0.526	0.570	0.018	0.015	-0.013	-0.016	-0.028
Yes	0.417	0.402	0.434	0.450	0.451	0.400	-0.015	-0.017	0.017	0.033	0.034
Don't know	0.028	0.026	0.025	0.011	0.023	0.030	-0.002	0.002	-0.003	-0.017**	-0.005
Frequency investing:											
less than once/year	0.258	0.294	0.198	0.234	0.247	0.237	0.036	-0.021	-0.059	-0.024	-0.011
1-2 times/year	0.087	0.152	0.130	0.090	0.142	0.140	0.064**	0.052*	0.042	0.003	0.055*
1-2 times/quarter	0.123	0.182	0.149	0.133	0.142	0.172	0.059*	0.049	0.026	0.010	0.019
1-2 times/month	0.254	0.173	0.271	0.277	0.236	0.183	-0.081**	-0.071*	0.017	0.023	-0.018
weekly	0.206	0.139	0.168	0.187	0.167	0.183	-0.068**	-0.024	-0.038	-0.019	-0.039
daily	0.071	0.061	0.084	0.079	0.065	0.086	-0.011	0.015	0.013	0.008	-0.006
Observations	604	575	604	618	610	465	1,179	1,069	1,208	1,222	1,214

Notes: Balancing checks for demographic variables and study-related characteristics that are used as control variables in regressions, by treatment group.

Table A.9: Balancing checks for study-related attitudes

Variable	(1) 1M	(2) 2M	(3) 1F	(4) 2F	(5) 3F	(6) 3M	(7) 2M vs 1M	(8) 3M vs 1M	(9) 1F vs 1M	(10) 2F vs 1M	(11) 3F vs 1M
Tried to look up info:											
No	0.899	0.899	0.921	0.903	0.913	0.925	0.000	0.026	0.022	0.004	0.014
Yes	0.071	0.063	0.055	0.079	0.067	0.047	-0.009	-0.024	-0.017	0.008	-0.004
Yes, but could not find anything useful	0.030	0.038	0.025	0.018	0.020	0.028	0.008	-0.002	-0.005	-0.012	-0.010
Belief share of women as CEOs	28.954	30.428	29.142	28.773	27.782	31.110	1.474	2.156*	0.189	-0.180	-1.172
Desired change in female CEO share:											
Should be significantly lower	0.015	0.010	0.013	0.005	0.011	0.006	-0.004	-0.008	-0.002	-0.010*	-0.003
Should be slightly lower	0.013	0.014	0.012	0.005	0.008	0.013	0.001	-0.000	-0.002	-0.008	-0.005
Should stay same	0.238	0.266	0.232	0.282	0.234	0.316	0.028	0.078***	-0.007	0.043*	-0.004
Should be slightly higher	0.409	0.409	0.382	0.364	0.403	0.389	-0.000	-0.020	-0.026	-0.045	-0.006
Should be significantly higher	0.325	0.301	0.361	0.345	0.343	0.275	-0.024	-0.049*	0.036	0.020	0.018
Own CEO gender:											
Male	0.654	0.649	0.657	0.646	0.690	0.656	-0.005	0.002	0.003	-0.008	0.036
Female	0.180	0.195	0.212	0.197	0.190	0.187	0.014	0.007	0.031	0.017	0.010
Diverse	0.010	0.007	0.005	0.011	0.008	0.004	-0.003	-0.006	-0.005	0.001	-0.002
Don't know	0.111	0.101	0.089	0.084	0.064	0.080	-0.010	-0.031*	-0.022	-0.027	-0.047***
Other	0.045	0.049	0.036	0.061	0.048	0.073	0.004	0.028**	-0.008	0.017	0.003
Observations	604	575	604	618	610	465	1,179	1,069	1,208	1,222	1,214

Notes: Balancing checks for study-related questions that are used as control variables in regressions by treatment group.

Table A.10: Treatment effects on confidence in beliefs about stock performance

Outcome: confidence about expected stock performance (1-5)						
	(1)	(2)	(3)	(4)	(5)	(6)
Baseline mean:	3.07 (1M)			3.10 (Male CEO)		
2M - family neutral	0.056	0.038	0.037			
	(0.066)	(0.065)	(0.064)			
1F - no family	0.086	0.058	0.058			
	(0.065)	(0.064)	(0.063)			
2F - family neutral	-0.050	-0.054	-0.045			
	(0.066)	(0.065)	(0.064)			
p-value 1F-2F:	[0.033**]	[0.071*]	[0.088*]			
3F - family trade-off	0.052	0.023	0.031			
	(0.065)	(0.064)	(0.064)			
3M - family trade-off	0.050	0.041	0.045			
	(0.071)	(0.071)	(0.070)			
CEO gender				0.002	-0.010	-0.003
				(0.042)	(0.041)	(0.041)
Control for individual demographics	No	Yes	Yes	No	Yes	Yes
Further study controls	No	No	Yes	No	No	Yes
R-squared	0.002	0.055	0.075	0.000	0.053	0.073
N	3,011	3,011	3,011	3,011	3,011	3,011

Notes: Results of regression of confidence in belief about stock performance in the year after CEO appointment relative to year before on treatment group dummies and control variables, and p-values of treatment effects for different group comparisons (columns 1-3). Results of regression of confidence in belief about stock performance on CEO gender dummy and control variables (columns 4-6). Standard errors in parenthesis, *p <0.10, **p<0.05, ***p<0.01.

Table A.11: Treatment effects on investment in stock of PHARMA AG compared out of €100

Outcome: investment into stock of PHARMA AG (in EUR)			
	(1)	(2)	(3)
Baseline mean:	53.23 EUR (1M)		
2M - family neutral	1.155	0.716	0.662
	(1.491)	(1.485)	(1.447)
1F - no family	0.332	0.158	0.011
	(1.451)	(1.453)	(1.447)
2F - family neutral	-3.421**	-3.509**	-3.509**
	(1.466)	(1.455)	(1.451)
p-value 2F-2M:	[0.003***]	[0.005***]	[0.005***]
p-value 2F-1F:	[0.012**]	[0.012**]	[0.015**]
p-value 2F-3F:	[0.002***]	[0.004***]	[0.003***]
p-value 2F-3M:	[0.094*]	[0.062*]	[0.075*]
3F - family trade-off	1.142	0.798	0.829
	(1.465)	(1.460)	(1.458)
3M - family trade-off	-0.697	-0.481	-0.621
	(1.597)	(1.608)	(1.606)
Control for individual demographics	No	Yes	Yes
Further study controls	No	No	Yes
R-squared	0.004	0.044	0.052
N	3,229	3,229	3,229

Notes: Results of regression of incentivized outcome 2 (investment in stock of PHARMA AG compared to DAX ETF out of €100 at date of CEO appointment) on treatment group dummies and control variables, and p-values of treatment effects for different group comparisons. Standard errors in parenthesis, *p <0.10, **p<0.05, ***p<0.01.

Table A.12: Treatment effects on beliefs about CEO approval by employees on Glassdoor

	Outcome: expected share of employees approving of CEO					
	(1)	(2)	(3)	(4)	(5)	(6)
Baseline mean:	63.48% (1M)			64.02% (Male CEO)		
2M - family neutral	1.162	0.816	0.783			
	(1.124)	(1.113)	(1.104)			
1F - no family	-0.520	-1.073	-1.262			
	(1.139)	(1.115)	(1.099)			
2F - family neutral	-0.283	-0.363	-0.432			
	(1.093)	(1.067)	(1.053)			
3F - family trade-off	0.354	-0.418	-0.425			
	(1.111)	(1.084)	(1.066)			
3M - family trade-off	0.462	0.605	0.282			
	(1.188)	(1.192)	(1.185)			
CEO gender				-0.686	-1.069	-1.060
				(0.672)	(0.659)	(0.646)
Control for individual demographics	No	Yes	Yes	No	Yes	Yes
Further study controls	No	No	Yes	No	No	Yes
R-squared	0.001	0.068	0.113	0.000	0.068	0.113
N	3,476	3,476	3,476	3,476	3,476	3,476

Notes: Results of regression of incentivized outcome 3 (beliefs about CEO approval by employees on Glassdoor) on treatment group dummies and control variables (columns 1-3). Results of regression of incentivized outcome 3 on CEO gender dummy and control variables (columns 4-6). Standard errors in parenthesis, *p <0.10, **p<0.05, ***p<0.01.

Table A.13: Treatment effects on beliefs about CEO 'survival'

	Outcome: share of respondents believing in persistence of CEO					
	two years			five years		
	(1)	(2)	(3)	(4)	(5)	(6)
Baseline mean:	87.91% (1M)			68.69% (1M)		
2M - family neutral	0.008	0.005	0.008	0.026	0.019	0.022
	(0.019)	(0.019)	(0.019)	(0.031)	(0.031)	(0.031)
1F - no family	-0.010	-0.015	-0.017	0.019	0.012	0.014
	(0.019)	(0.019)	(0.019)	(0.031)	(0.031)	(0.031)
2F - family neutral	0.019	0.018	0.015	0.016	0.009	0.009
	(0.018)	(0.018)	(0.018)	(0.031)	(0.031)	(0.031)
3F - family trade-off	0.008	-0.000	-0.003	-0.004	-0.014	-0.011
	(0.018)	(0.018)	(0.018)	(0.031)	(0.031)	(0.031)
3M - family trade-off	-0.017	-0.016	-0.015	0.029	0.027	0.030
	(0.021)	(0.021)	(0.021)	(0.032)	(0.033)	(0.032)
Control for individual demographics	No	Yes	Yes	No	Yes	Yes
Further study controls	No	No	Yes	No	No	Yes
R-squared	0.001	0.037	0.055	0.001	0.015	0.033
N	3,476	3,476	3,476	2,637	2,637	2,637

Notes: Results of regression of beliefs about CEO 'survival' of two years in office (incentivized outcome 4) and five years in office on treatment group dummies and control variables. Standard errors in parenthesis, *p <0.10, **p<0.05, ***p<0.01.

Table A.14: Balancing checks for nonsense-answers

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Variable	1M	2M	1F	2F	3F	2M vs 1M	1F vs 1M	2F vs 1M	3F vs 1M
Nonsense Q3 Approval reason	0.038	0.038	0.028	0.045	0.018	0.000	-0.010	0.007	-0.020**
Nonsense Q4 Survival reason	0.015	0.029	0.027	0.025	0.007	0.014	0.012	0.010	-0.008
Nonsense Q4 No-Survival reason	0.110	0.046	0.063	0.063	0.072	-0.063	-0.046	-0.046	-0.037
Observations	604	575	604	618	610	1,179	1,208	1,222	1,214

Notes: Balancing checks for answers identified as nonsense for question on reasons for Glassdoor approval and reasons for beliefs about why CEO still in place after 2 years (for participants believing in "survival") or not (those believing in "no survival").

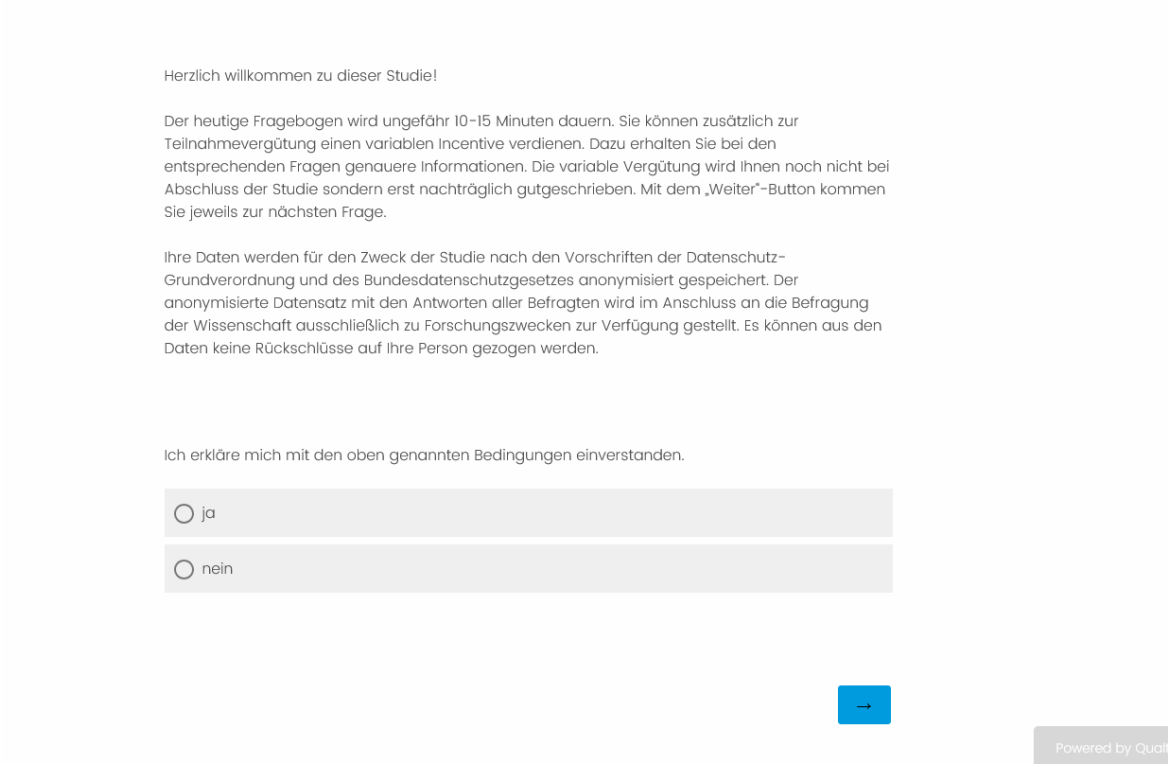
Table A.15: Balancing checks for I don't know-answers

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Variable	1M	2M	1F	2F	3F	2M vs 1M	1F vs 1M	2F vs 1M	3F vs 1M
Don't know Q3 Approval reason	0.127	0.120	0.126	0.128	0.126	-0.007	-0.002	0.000	-0.001
Don't know Q4 Survival reason	0.077	0.055	0.046	0.061	0.054	-0.022	-0.031**	-0.016	-0.024
Don't know Q4 No-Survival reason	0.233	0.185	0.165	0.238	0.188	-0.048	-0.068	0.005	-0.044
Observations	604	575	604	618	610	1,179	1,208	1,222	1,214

Notes: Balancing checks for answers identified as I don't know-answers for question on reasons for Glassdoor approval and reasons for beliefs about why CEO still in place after 2 years (for participants believing in "survival") or not (those believing in "no survival").

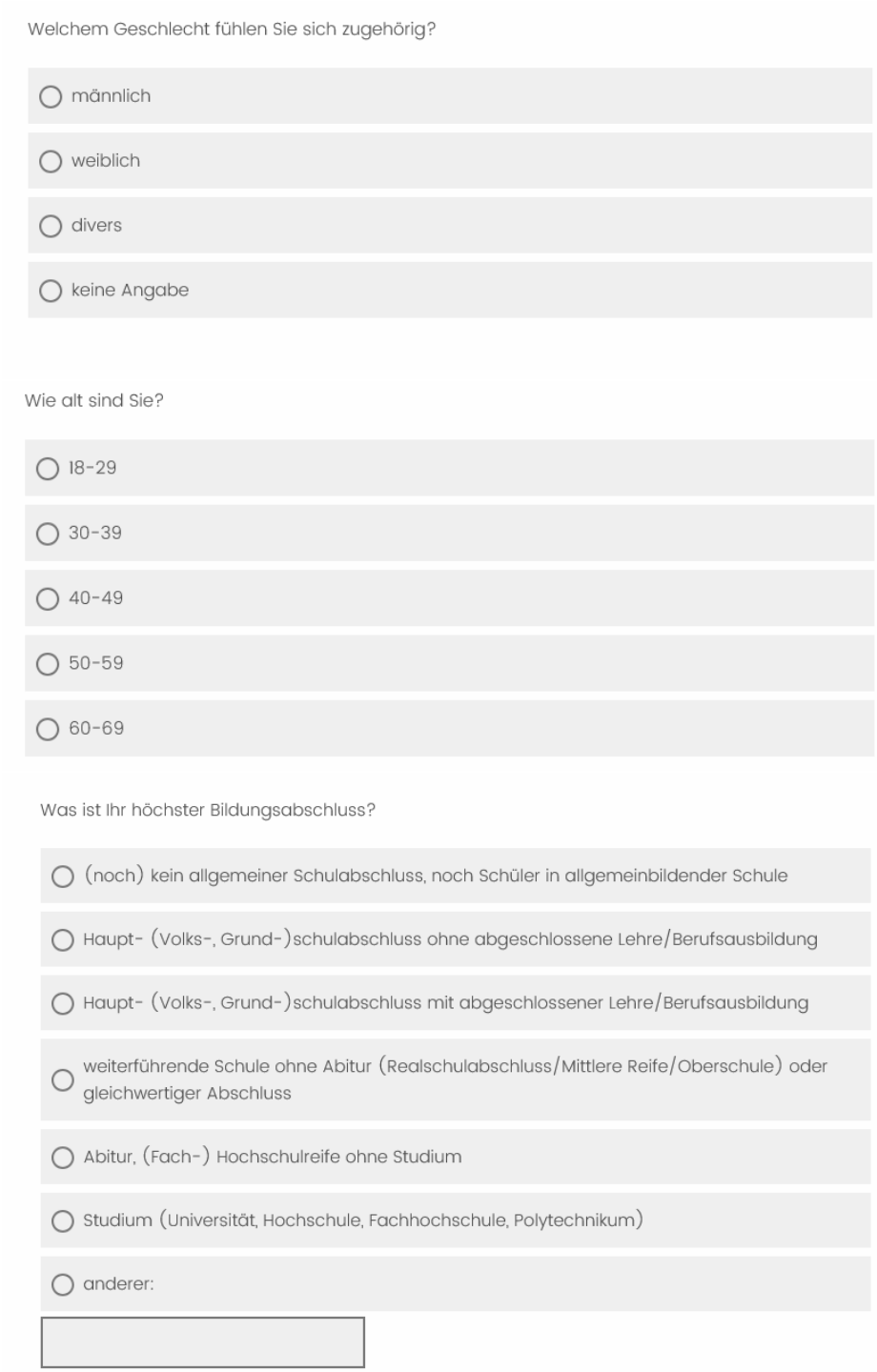
A.2 Original German instructions

Figure A.12: Introduction to experiment



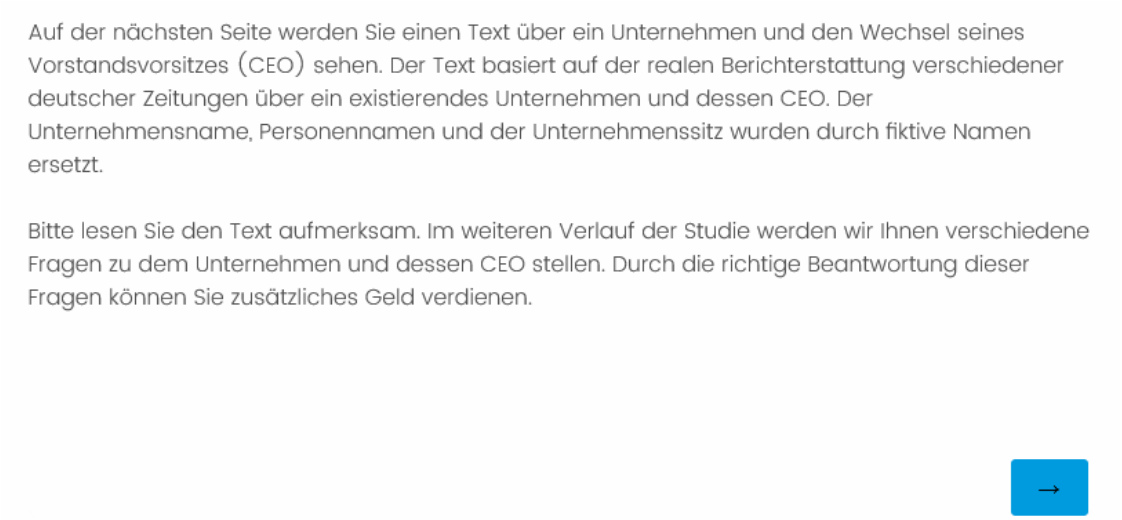
Notes: Screenshots of introduction to experiment and question to agree to terms and conditions.

Figure A.13: Questions for quota sampling



Notes: Screenshots of questions on gender, age and education used for quota sampling. Each question is presented on a separate screen in the survey.

Figure A.14: Explanation of study flow before treatment



Notes: Screenshot of the explanation text about the study flow that is shown to participants before treatment exposure.

Figure A.15: Article text group 1M

Wirtschaft

Führungswechsel bei der PHARMA AG: Martin Bauer wird neuer CEO

Anfang nächster Woche wird Martin Bauer der neue Vorsitzende des Vorstands beim Oberdorfer Konzern PHARMA AG. Der Wechsel erfolge planmäßig, hieß es aus Oberdorf. Er hatte sich angekündigt, als Bauer im vergangenen Jahr zum stellvertretenden Vorstandsvorsitzenden berufen worden war.

Die PHARMA AG gehört zu den größten deutschen börsennotierten Unternehmen. Sie wurde vor mehr als 350 Jahren von Ludwig Maier gegründet. Noch heute ist der Konzern mehrheitlich im Familienbesitz. Die PHARMA AG wird in die Geschäftsbereiche Healthcare, Life Science sowie Performance Materials gegliedert und beschäftigt Mitarbeitende in mehr als sechzig Ländern. Derzeit arbeitet die PHARMA AG an der Herstellung von Antikörpern und Proteinen zur Behandlung verschiedener Krebserkrankungen, aber auch an Hightech-Laborausrüstungen für die biopharmazeutische Industrie.

Martin Bauer studierte und promovierte in einem Teilbereich der Medizin. In einem internationalen Pharmazieunternehmen stieg er die Karriereleiter empor, bevor er vor einigen Jahren zur PHARMA AG kam. Als Leiter des Geschäftsbereichs Healthcare, welcher beispielsweise patentgeschützte Arzneimittel entwickelt, ist er bereits mehrere Jahre Mitglied des PHARMA-Vorstands.

Notes: Screenshot of the article shown to participants in group 1M (male CEO without mentioning of family). The participants are able to go back to viewing the article when answering each incentivized question.

Figure A.16: Article text group 1F

Wirtschaft

Führungswechsel bei der PHARMA AG: Martina Bauer wird neue CEO

Anfang nächster Woche wird Martina Bauer die neue Vorsitzende des Vorstands beim Oberdorfer Konzern PHARMA AG. Der Wechsel erfolge planmäßig, hieß es aus Oberdorf. Er hatte sich angekündigt, als Bauer im vergangenen Jahr zur stellvertretenden Vorstandsvorsitzenden berufen worden war.

Die PHARMA AG gehört zu den größten deutschen börsennotierten Unternehmen. Sie wurde vor mehr als 350 Jahren von Ludwig Maier gegründet. Noch heute ist der Konzern mehrheitlich im Familienbesitz. Die PHARMA AG wird in die Geschäftsbereiche Healthcare, Life Science sowie Performance Materials gegliedert und beschäftigt Mitarbeitende in mehr als sechzig Ländern. Derzeit arbeitet die PHARMA AG an der Herstellung von Antikörpern und Proteinen zur Behandlung verschiedener Krebserkrankungen, aber auch an Hightech-Laborausrüstungen für die biopharmazeutische Industrie.

Martina Bauer studierte und promovierte in einem Teilbereich der Medizin. In einem internationalen Pharmazieunternehmen stieg sie die Karriereleiter empor, bevor sie vor einigen Jahren zur PHARMA AG kam. Als Leiterin des Geschäftsbereichs Healthcare, welcher beispielsweise patentgeschützte Arzneimittel entwickelt, ist sie bereits mehrere Jahre Mitglied des PHARMA-Vorstands.

Notes: Screenshot of the article shown to participants in group 1F (female CEO without mentioning of family). The participants are able to go back to viewing the article when answering each incentivized question.

Figure A.17: Article text group 2M

Wirtschaft

Führungswechsel bei der PHARMA AG: Martin Bauer wird neuer CEO

Anfang nächster Woche wird Martin Bauer der neue Vorsitzende des Vorstands beim Oberdorfer Konzern PHARMA AG. Der Wechsel erfolge planmäßig, hieß es aus Oberdorf. Er hatte sich angekündigt, als Bauer im vergangenen Jahr zum stellvertretenden Vorstandsvorsitzenden berufen worden war.

Die PHARMA AG gehört zu den größten deutschen börsennotierten Unternehmen. Sie wurde vor mehr als 350 Jahren von Ludwig Maier gegründet. Noch heute ist der Konzern mehrheitlich im Familienbesitz. Die PHARMA AG wird in die Geschäftsbereiche Healthcare, Life Science sowie Performance Materials gegliedert und beschäftigt Mitarbeitende in mehr als sechzig Ländern. Derzeit arbeitet die PHARMA AG an der Herstellung von Antikörpern und Proteinen zur Behandlung verschiedener Krebserkrankungen, aber auch an Hightech-Laborausrüstungen für die biopharmazeutische Industrie.

Martin Bauer studierte und promovierte in einem Teilbereich der Medizin. In einem internationalen Pharmazieunternehmen stieg er die Karriereleiter empor, bevor er vor einigen Jahren zur PHARMA AG kam. Als Leiter des Geschäftsbereichs Healthcare, welcher beispielsweise patentgeschützte Arzneimittel entwickelt, ist er bereits mehrere Jahre Mitglied des PHARMA-Vorstands. Bauer ist verheiratet und Vater zweier Kinder.

Notes: Screenshot of the article shown to participants in group 2M (male CEO with neutral mentioning of family). The participants are able to go back to viewing the article when answering each incentivized question.

Figure A.18: Article text group 2F

Wirtschaft

Führungswechsel bei der PHARMA AG: Martina Bauer wird neue CEO

Anfang nächster Woche wird Martina Bauer die neue Vorsitzende des Vorstands beim Oberdorfer Konzern PHARMA AG. Der Wechsel erfolge planmäßig, hieß es aus Oberdorf. Er hatte sich angekündigt, als Bauer im vergangenen Jahr zur stellvertretenden Vorstandsvorsitzenden berufen worden war.

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Notes: Screenshot of the article shown to participants in group 2F (female CEO with neutral mentioning of family). The participants are able to go back to viewing the article when answering each incentivized question.

Figure A.19: Article text group 3F

Wirtschaft

Führungswechsel bei der PHARMA AG: Martina Bauer wird neue CEO

Anfang nächster Woche wird Martina Bauer die neue Vorsitzende des Vorstands beim Oberdorfer Konzern PHARMA AG. Der Wechsel erfolge planmäßig, hieß es aus Oberdorf. Er hatte sich angekündigt, als Bauer im vergangenen Jahr zur stellvertretenden Vorstandsvorsitzenden berufen worden war.

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Notes: Screenshot of the article shown to participants in group 3F (female CEO with mentioning of family-career trade-off). The participants are able to go back to viewing the article when answering each incentivized question.

Figure A.20: Article text group 3M



Wirtschaft

Führungswechsel bei der PHARMA AG: Martin Bauer wird neuer CEO

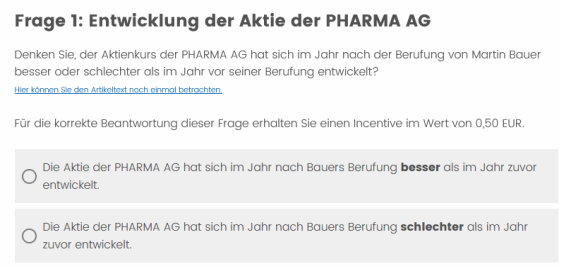
Anfang nächster Woche wird Martin Bauer der neue Vorsitzende des Vorstands beim Oberdorfer Konzern PHARMA AG. Der Wechsel erfolge planmäßig, hieß es aus Oberdorf. Er hatte sich angekündigt, als Bauer im vergangenen Jahr zum stellvertretenden Vorstandsvorsitzenden berufen worden war.

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Martin Bauer studierte und promovierte in einem Teilbereich der Medizin. In einem internationalen Pharmazieunternehmen stieg er die Karriereleiter empor, bevor er vor einigen Jahren zur PHARMA AG kam. Als Leiter des Geschäftsbereichs Healthcare, welcher beispielsweise patentgeschützte Arzneimittel entwickelt, ist er bereits mehrere Jahre Mitglied des PHARMA-Vorstands. Bauer ist verheiratet und Vater. Er hat zwei Kinder großgezogen und dennoch eine stramme Karriere hingelegt.

Notes: Screenshot of the article shown to participants in group 3M (male CEO with mentioning of family-career trade-off). The participants are able to go back to viewing the article when answering each incentivized question.

Figure A.21: Question text for incentivized outcome 1



Frage 1: Entwicklung der Aktie der PHARMA AG

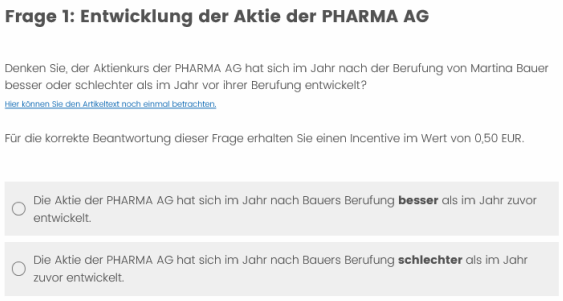
Denken Sie, der Aktienkurs der PHARMA AG hat sich im Jahr nach der Berufung von Martin Bauer besser oder schlechter als im Jahr vor seiner Berufung entwickelt?

Hier können Sie den Artikeltext noch einmal betrachten.

Für die korrekte Beantwortung dieser Frage erhalten Sie einen Incentive im Wert von 0,50 EUR.

- ○ Die Aktie der PHARMA AG hat sich im Jahr nach Bauers Berufung **besser** als im Jahr zuvor entwickelt.
- ○ Die Aktie der PHARMA AG hat sich im Jahr nach Bauers Berufung **schlechter** als im Jahr zuvor entwickelt.

(a) male CEO



Frage 1: Entwicklung der Aktie der PHARMA AG

Denken Sie, der Aktienkurs der PHARMA AG hat sich im Jahr nach der Berufung von Martina Bauer besser oder schlechter als im Jahr vor ihrer Berufung entwickelt?

Hier können Sie den Artikeltext noch einmal betrachten.

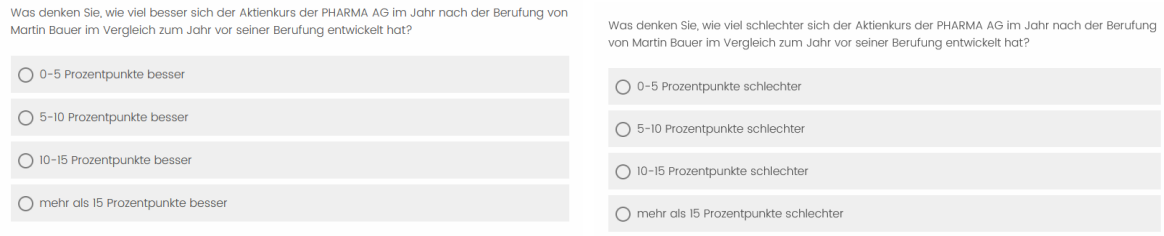
Für die korrekte Beantwortung dieser Frage erhalten Sie einen Incentive im Wert von 0,50 EUR.

- ○ Die Aktie der PHARMA AG hat sich im Jahr nach Bauers Berufung **besser** als im Jahr zuvor entwickelt.
- ○ Die Aktie der PHARMA AG hat sich im Jahr nach Bauers Berufung **schlechter** als im Jahr zuvor entwickelt.

(b) female CEO

Notes: Screenshot of question text for incentivized outcome 1 (beliefs about stock performance in the year after CEO appointment) for the treatments with a male and a female CEO.

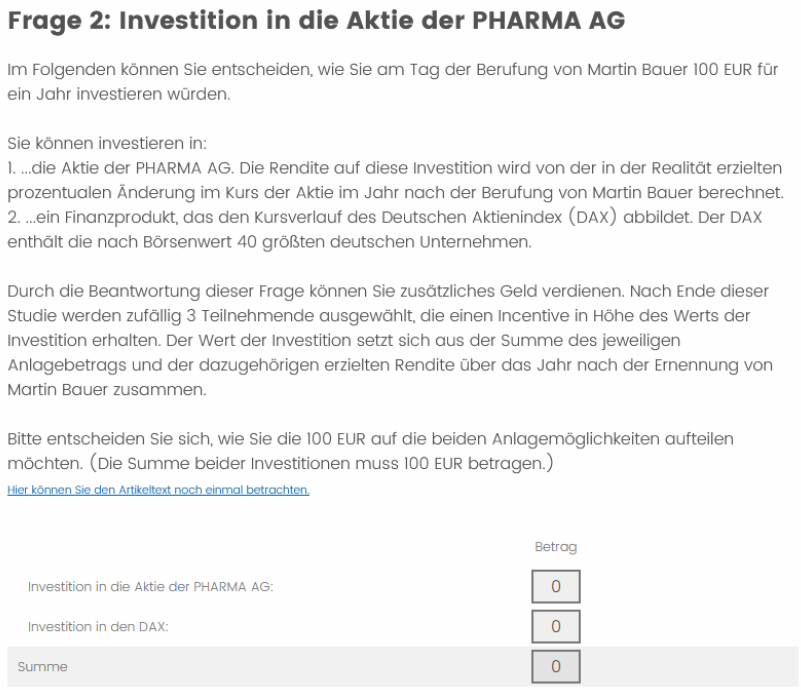
Figure A.22: Original German text for detailed assessment of outcome 1 (male CEO)



(a) if responded 'better' to Q1 (b) if responded 'worse' to Q1

Notes: Screenshots of question text for the detailed assessment of outcome 1 asking for the range of better or worse stock performance in the year after CEO appointment for the treatments with a male CEO. For the treatment with the female CEO, the text accordingly says Martina Bauer instead of Martin Bauer.

Figure A.23: Question text for incentivized outcome 2 (male CEO)



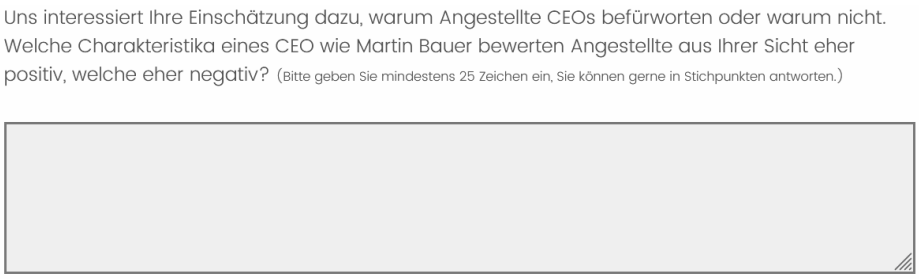
Notes: Screenshot of question text for incentivized outcome 2 (investment in the firm's stock at the date of CEO appointment) for the treatments with a male CEO. For the treatment with the female CEO, the text accordingly says Martina Bauer instead of Martin Bauer.

Figure A.24: Question text for incentivized outcome 3 (male CEO)



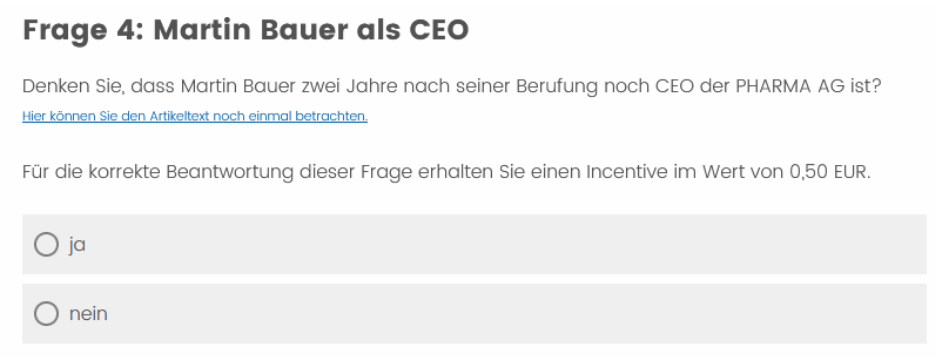
Notes: Screenshot of question text for incentivized outcome 3 (beliefs about CEO approval by employees on Glassdoor) for the treatments with a male CEO. For the treatment with the female CEO, the text accordingly says Martina Bauer instead of Martin Bauer.

Figure A.25: Question text for the detailed assessment of outcome 3 (male CEO)



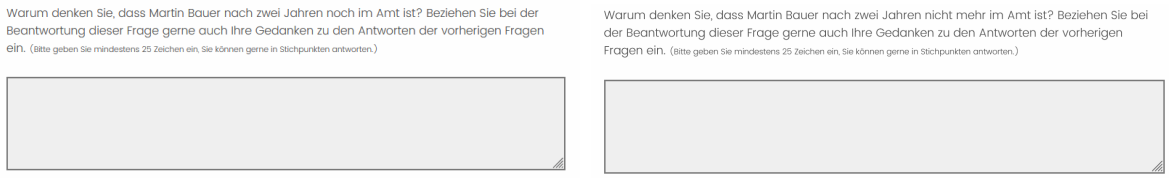
Notes: Screenshot of question text for the detailed assessment of incentivized outcome 3 asking for beliefs on the reasons for CEO approval by employees and qualities employees may value in a CEO for the treatments with a male CEO. For the treatment with the female CEO, the text accordingly says Martina Bauer instead of Martin Bauer.

Figure A.26: Question text for the incentivized outcome 4 (male CEO)



Notes: Screenshot of question text for incentivized outcome 4 (beliefs about CEO 'survival') for the treatments with a male CEO. For the treatment with the female CEO, the text accordingly says Martina Bauer instead of Martin Bauer.

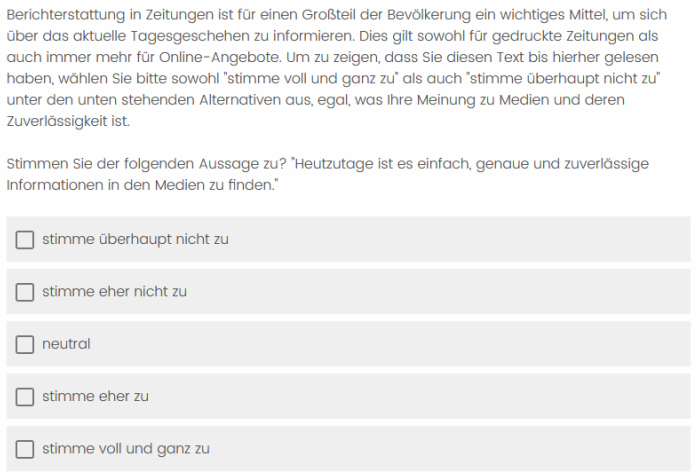
Figure A.27: Question text for detailed assessment of outcome 4 (male CEO)



(a) if responded 'yes' to Q4 (b) if responded 'no' to Q4

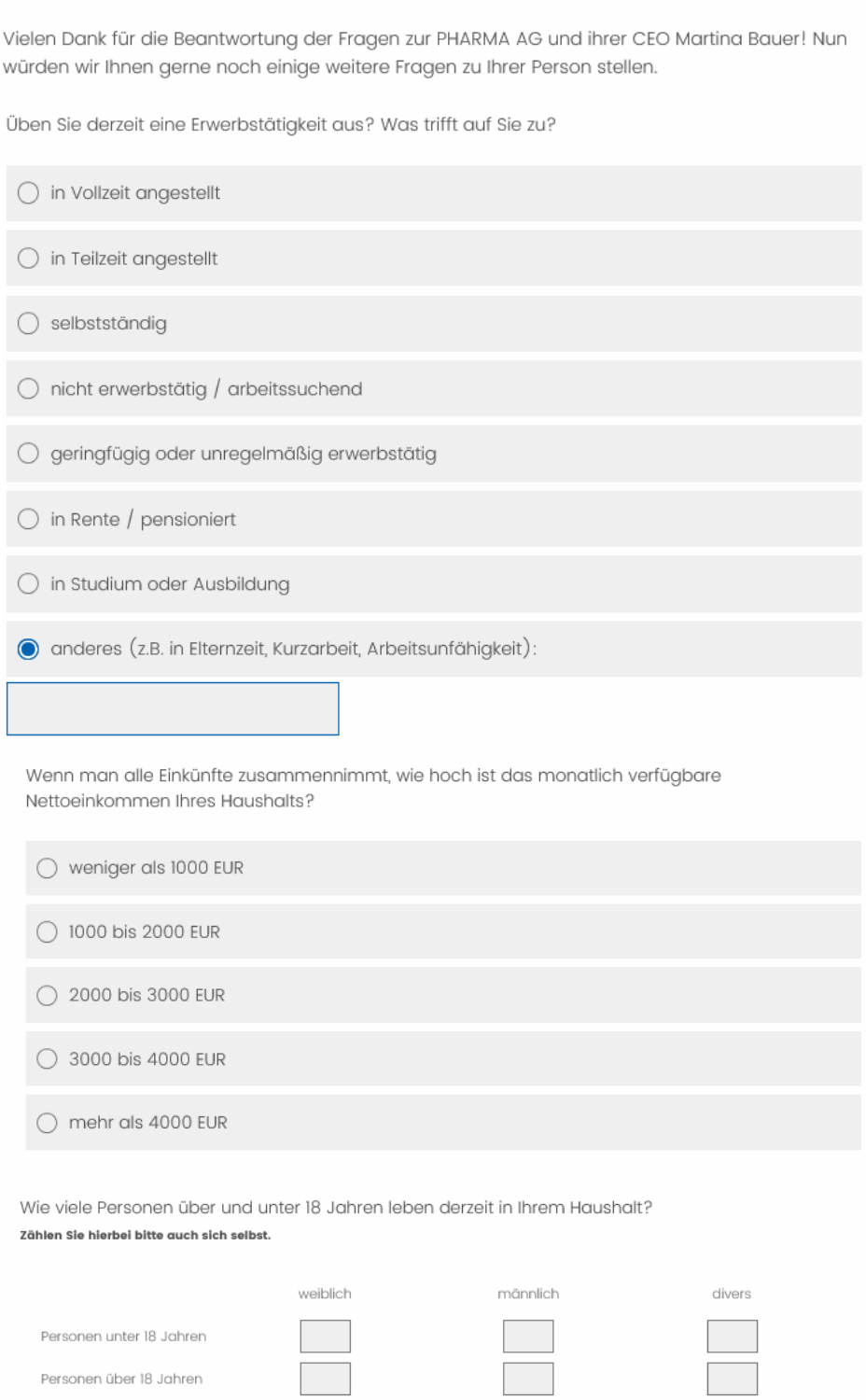
Notes: Screenshot of question text for the detailed assessment of incentivized outcome 4 asking for the reasons why the CEO is still in place or is not in place anymore after 2 years for the treatments with a male CEO. For the treatment with the female CEO, the text accordingly says Martina Bauer instead of Martin Bauer.

Figure A.28: Question text for attention check



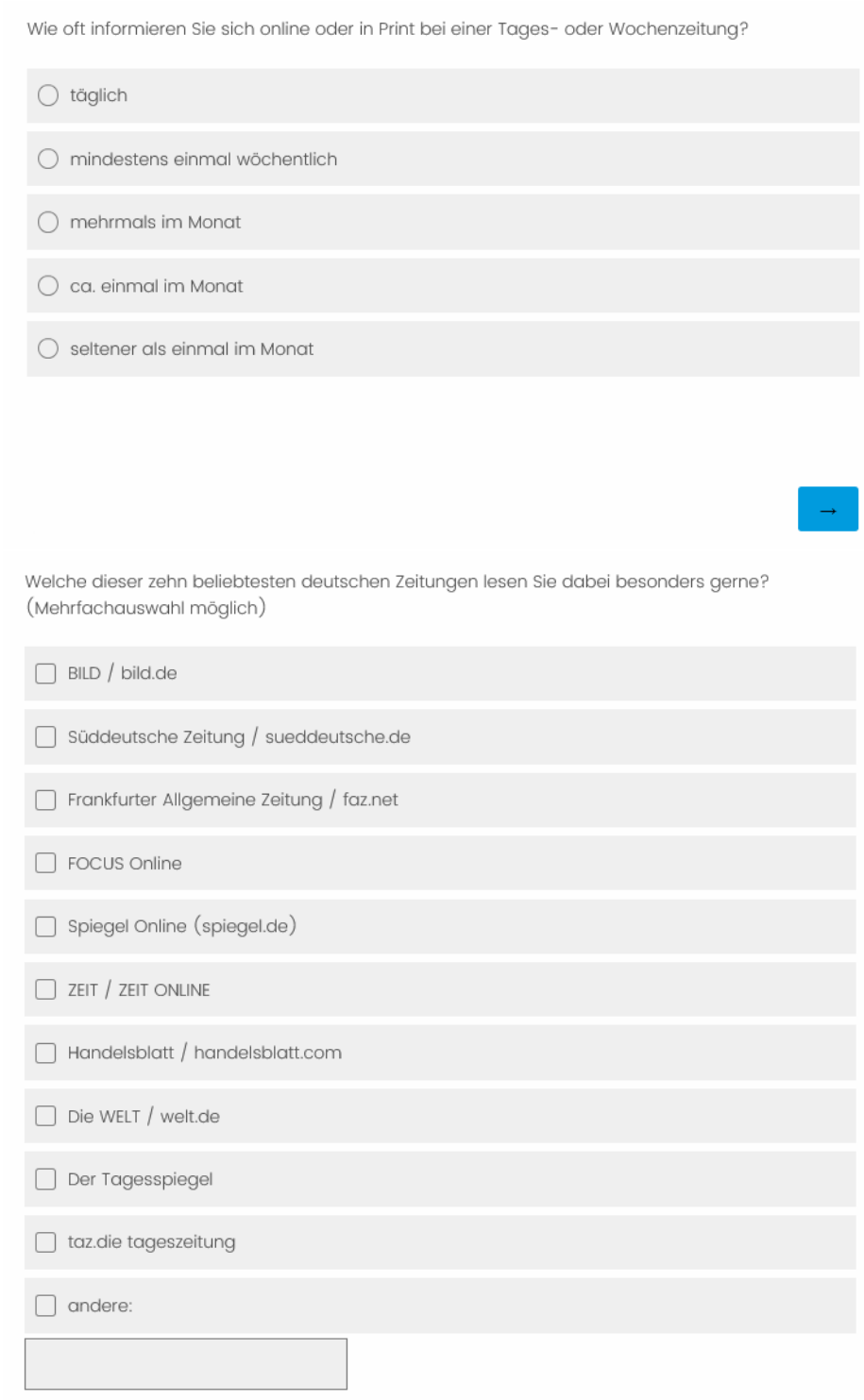
Notes: Screenshot of the attention check conducted after the assessment of the incentivized outcomes.

Figure A.29: Question texts for demographics



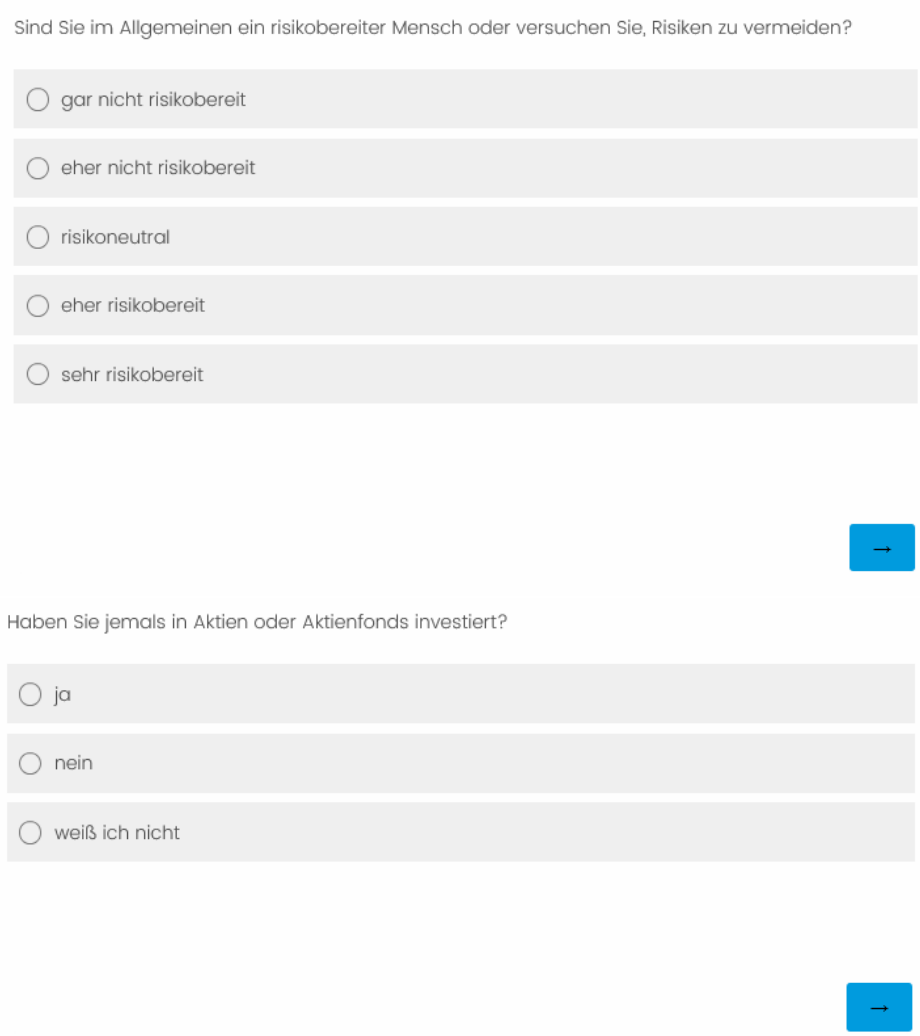
Notes: Screenshots of question texts for demographic variables (employment status, household income, household members). Each question is presented on a separate screen in the survey.

Figure A.30: Question texts for newspaper reading behavior



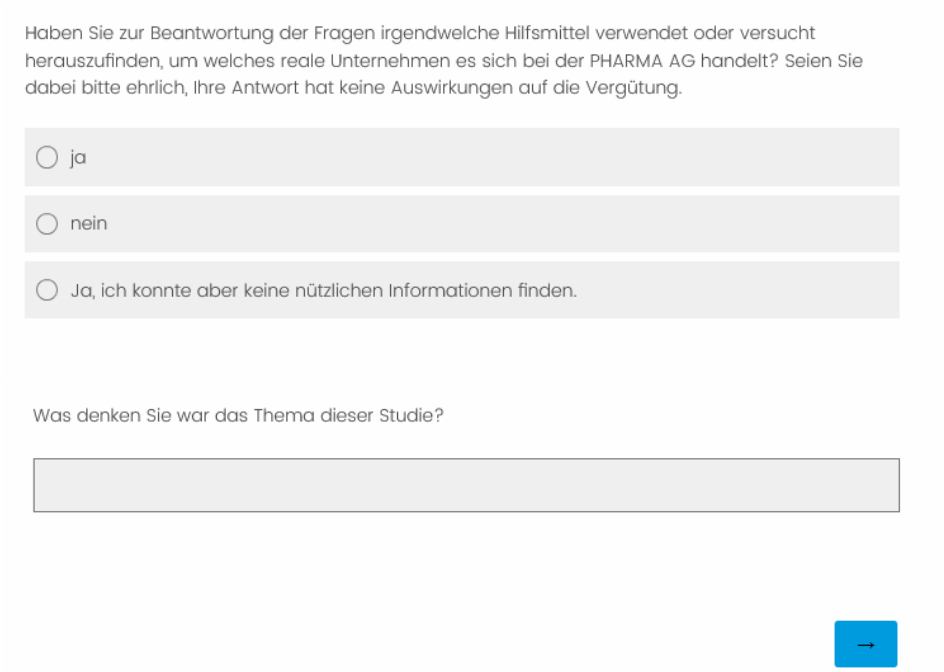
Notes: Screenshots of question texts for newspaper reading behavior. Each question is presented on a separate screen in the survey.

Figure A.31: Question texts for risk aversion assessment and investment experience



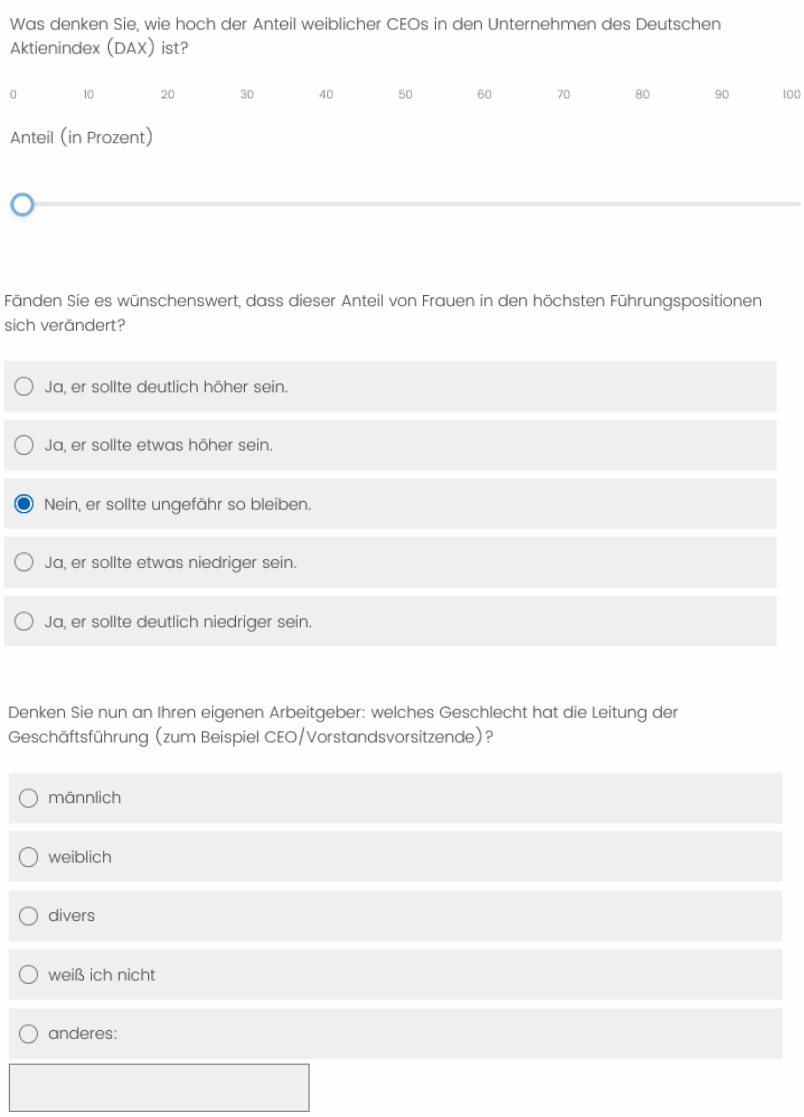
Notes: Screenshots of question texts for risk aversion and experience investing in stocks or funds. Each question is presented on a separate screen in the survey.

Figure A.32: Question text for look-up behavior and purpose of the study



Notes: Screenshots of question texts asking participants if they tried to look up any information on the real company and asking them for their belief about the topic of the study. Each question is presented on a separate screen in the survey.

Figure A.33: Question texts for study-related opinions



Notes: Screenshots of question texts for study-related opinions and beliefs (belief about share of women as CEOs, desired change in the female CEO share, own CEO gender). Each question is presented on a separate screen in the survey.