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Local gender imbalance and corporate risk-taking☆

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ABSTRACT

We study the effects of local gender imbalance on corporate risk-taking. We find that firms in areas with a higher local male–female ratio have higher stock return volatilities, leverage ratios and capital expenditure, and less corporate hedging. Consequently, such firms face higher loan spreads, more collateral requirements and capital expenditure restrictions, and have more covenant violations. We address endogeneity concerns by using two instrumental variables for the local male-female ratio: the local prostate cancer and breast cancer mortality rates. We further show that local gender imbalance captures local residents' risk preferences, which influence corporate policies via both local investor and employee channels.

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Gender imbalance has profound effects on various aspects of life and society, such as elections, crime, marriages, societal stability, and economic growth (Hesketh and Zhu, 2006; Dyson, 2012).[1] A growing body of literature explores the impacts of gender differences among corporate executives and directors on corporate governance, investments, innovation, and financial policies.[2] However, limited attention is devoted to the relationship between gender imbalances among local residents and corporate policies. This paper aims to fill this gap by studying how local gender imbalances affect corporate policies via

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[1] For example, the state legislature in Wyoming first passed a bill granting female residents 21 years and older the right to vote in 1869 (women's suffrage was not granted nationwide until the ratification of the Nineteenth Amendment to the US Constitution in 1920), hoping to attract more single women to Wyoming to rectify the gender imbalance at that time (a male–female ratio of 6-to-1).

[2] See, e.g., Adams and Ferreira (2009), Ahern and Dittmar (2012), Graham, Harvey, and Puri (2013), Huang and Kisgen (2013), Faccio, Marchica, and Mura (2016), and Griffin, Li, and Xu (2021).

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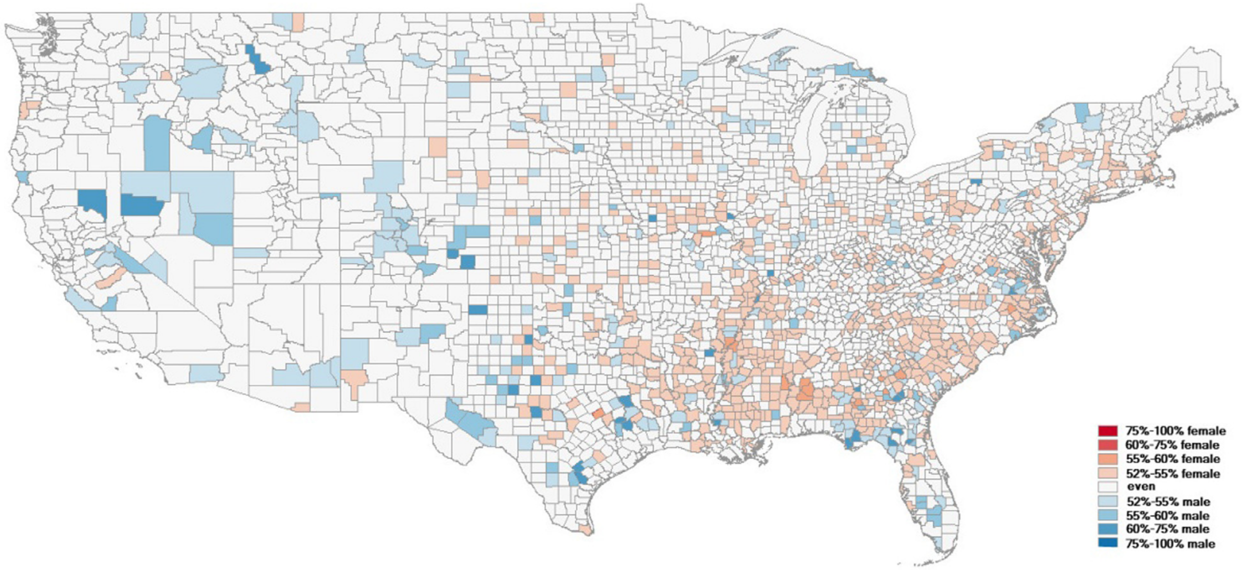

Figure 1. Local Gender Ratio in the US
This figure plots the male–female ratio across different counties in the United States in 2005. We obtain the data from the U.S. Census Bureau and focus on the population of prime work age (between 20 and 64 years).

the lens of risk attitudes. Given that corporate risk-taking activities are crucial for firm performances and economic growth, we attempt to trace corporate risk-taking rooted in the risk preferences and beliefs of local residents. In particular, we use local gender imbalances, i.e., the local male–female ratios, to identify variations in the risk attitudes of local residents and investigate how these variations affect corporate risk-taking.

The validity of using the local male–female ratio to identify the risk attitudes of local residents is strongly supported by experimental and survey studies, which show that men are typically less risk averse than women (e.g., Croson and Gneezy, 2009; Charness and Gneezy, 2012; Ertac and Gurdal, 2012; Jacobsen et al., 2014; Falk et al., 2018; Brooks et al., 2019; Cueva et al., 2019; Czibor et al., 2019). This difference in risk aversion might be driven by biological, cultural and social factors.[3] Male identity might also increase the likelihood of overconfidence in men (D'Acunto, 2020). Consistent with these arguments, we find that higher local male–female ratios are associated with lower levels of risk aversion and higher levels of overconfidence according to the General Social Survey (GSS). That is, local gender imbalance captures both the risk preferences and beliefs of local residents.

Fig. 1 shows the county-level gender ratios among the prime work age population (aged 20–64 years) in the U.S. in 2005. This graph reveals large variations in the local male–female ratios across counties.[4] Interestingly, there are considerable variations in gender ratios even across counties within the same state (e.g., Texas or Florida). These variations in local gender imbalance make it feasible to examine the effects of local residents' risk attitudes on corporate risk-taking. We find that firms operating in counties with a higher local male-female ratio have higher risk profiles in terms of corporate financial and investment policies. We further show that these effects of gender imbalance are expressed mainly through the risk attitude channel.

We structure our empirical investigation as follows. First, we find that a higher local male–female ratio is related to a higher level of firm risk, measured as option-implied stock return volatility. For example, a one standard deviation increase in the local male–female ratio is associated with an increase of a firm's option-implied return volatility by approximately 8.0% relative to the sample mean. Second, we show that firms headquartered in counties with a higher male-female ratio have higher market leverage, higher capital expenditure, and lower cash holdings; engage in fewer hedging activities; and have higher likelihood of covenant violations. Third, we study the value implications of the local male-female ratios by examining ex ante loan contract terms. We find that firms headquartered in counties with a higher local male-female ratio face higher loan spreads, are more likely to face collateral requirements and capital expenditure restrictions in loan agreements, and have more covenant violations.

[3] See, e.g., Sapienza, Zingales, and Maestripieri (2009), Cesarini et al. (2010), Häusler et al. (2018), Benabou and Tirole (2011), Benjamin, Choi, and Strickland (2010), Falk et al. (2018), and D'Acunto (2020).

[4] Existing sociological, medical, biological, and demographic studies have found extensive yet inconclusive evidence on what drives the variations in local male-female ratios across different regions. Different explanations have been proposed, such as smoking (Waldron 1986; Preston and Wang, 2006), minimum drinking age (Carpenter and Dobkin, 2009), excess liquor consumption (Sacks et al., 2010), historical war-related mortalities (Ferrara, 2021), gender-specific mortalities (Jemal et al., 2002; De Angelis, et al., 2009), and numerous factors affecting sex ratio at birth (e.g., Jacobsen, 2001; Mathews and Hamilton,2005; Davis, et al., 2007; Navara, 2009).

We address potential endogeneity concerns in three stages. First, we address concerns about omitted variables by including other local characteristics in our analyses, such as the interaction of industry and year fixed effects, county fixed effects, local cultural factors (i.e., gender egalitarianism and religiosity), and the local proportion of retirees. Second, we address concerns about reverse causality. Specifically, to address the concern that local industry drives labor movement and leads to local gender imbalance, we examine subsamples of firms whose revenues are mainly earned out of state and subsamples of counties where the correlation between the industry gender ratio and local gender ratio is weak. Third, we run two-stage least squares (2SLS) regressions using instrumental variables. The instrumental variables comprise the mortality rates of local prostate cancer and breast cancer incidences. Although prostate cancer and breast cancer affect the local gender ratio, firms are unlikely to tailor their risk-taking policies to address the risks of these cancers. Our results suggest that the observed effects of local gender imbalance on corporate risk-taking are unlikely to be driven by omitted firm or other local characteristics.

One might wonder whether cross-county variations in the male–female ratio are large enough to have significant effects on corporate policies. To address this question quantitatively, we closely examine the gender ratio distributions across various county subsamples. We find that our results remain reasonably significant even after excluding counties in the top and bottom 20% of the gender ratio distributions (i.e., 40% of the total sample). More importantly, as variations in the local male–female ratio increase, our results become both statistically more significant and economically more impactful, confirming the impact of local gender imbalance.

Next, we dig deeply to understand the mechanisms through which local gender imbalance influences corporate decisions. Local residents can influence corporate policies by expressing their risk attitudes in two ways. First, local residents are often the shareholders of local firms. Studies show that retail investors' portfolios are often under-diversified and exhibit significant local bias (Coval and Moskowitz, 2001; Huberman, 2001; Grinblatt and Keloharju, 2001; Ivković and Weisbenner, 2005; Massa and Simonov, 2006; Bernile, Kumar, and Sulaeman, 2015). Large local investors, or a collection of local retail investors, can influence corporate policies by engaging directly in decision-makings (Becker, Cronqvist and Fahlenbrach, 2011; Kandel, Massa and Simonov, 2011; Brav, Cain, and Zytnick, 2021). Additionally, firms often cater to the preferences of local retail investors (Becker, Ivković, and Weisbenner, 2011), suggesting the local investor channel. To examine this channel, we follow Becker, Ivković, and Weisbenner (2011) to show that our findings are more pronounced when local investors are more likely to have large influences, e.g., among smaller firms and in counties with fewer firms.

Second, local residents might affect firm operations through the employee channel, wherein local residents act as corporate employees.[5] Local employees are under-diversified due to firm-specific human capital or equity-based compensation, and they share a similar cultural legacy (Guiso, Sapienza, and Zingales, 2006). Therefore, these employees might collectively express their risk attitudes through their work, or firms may cater to the risk preferences of employees, even those who are not executives (Spalt, 2013). Both of these responses affect firms' risk-taking behavior. We find that firms based in areas with a higher male-female ratio have fewer female employees, employ fewer female CEOs and board directors, and have more overconfident CEOs. These findings suggest the presence of an employee channel that reflects the risk attitudes of local residents with regard to corporate decision making. This employee channel might co-exist with the investor channel because investors tend to choose entrepreneurs of the same gender as themselves (Ewens and Townsend, 2020). Thus, the effects of the investor channel and employee channel can be mutually strengthened.

Our paper contributes to the growing literature exploring the connection between gender differences and risk attitudes. Experimental studies consistently find that women are more financially risk averse than men (Charness and Gneezy, 2012; Ertac and Gurdal, 2012; Cueva et al., 2019; Czibor, Claussen, and Praag, 2019). Our paper complements the existing literature by exploiting broad demographic information in census data and finds consistent results.

Moreover, our paper adds to the literature investigating the impacts of gender differences on corporate policies. In terms of female employees, Weber and Zulehner (2010) find that female hires of start-up firms increase the companies' survival probabilities. In terms of female directors, previous literature shows that a higher percentage of female directors is associated with better attendance, more monitoring committees' assignments, better governance outcomes (Adams and Ferreira, 2009), and enhanced corporate innovation (Griffin, Li and Xu, 2021). In terms of female CEOs, previous literature finds that female CEOs are associated with less acquisitions and better acquisition performance (Huang and Kisgen, 2013), lower debt ratios (Graham, Harvey, and Puri, 2013), less volatile earnings, higher chance of survival, and overall lower corporate risk-taking (Faccio, Marchica, and Mura, 2016). We add to the literature in three ways. First, we extend previous studies to a broader base, i.e., gender differences among local residents, and relate them to corporate risk-taking. Second, in terms of ex ante impacts, we add to the literature by examining the impact of local gender imbalance on loan contract terms. Third, in terms of ex post outcomes, in addition to the usual sets of corporate financial and risk-taking outcomes examined by the previous papers, we study risk management practices, i.e., corporate hedging policies adopted by industrial firms and banks.

Last, this paper contributes to the large body of literature on corporate risk-taking. Corporate risk-taking activities are affected by managerial personal traits (Malmendier and Tate, 2005; Malmendier and Tate, 2008; Hirshleifer, Low, and Teoh, 2012; Pan, Siegel, and Wang, 2017), career concerns (Hirshleifer and Thakor, 1992), compensation schemes (Coles, Daniel, and Naveen, 2006), and cultural backgrounds (Bedendo, Garcia-Appendini, and Siming, 2020); creditor gov-

[5] Huang and Kisgen (2013) and Faccio, Marchica, and Mura (2016) find that the presence of female executives or a larger proportion of female directors can reduce firm risk.

ernance (Acharya, Amihud, and Litov, 2011); litigation environment (John, Litov, and Yeung, 2008). Our paper adds to this literature by showing that the composition of the local population, specifically the gender ratio, is an important driver of corporate risk-taking.

This paper may also have potential policy implications. Our findings suggest that firms respond to the geographical variations in risk attitudes captured by gender imbalance, either through the local clientele or the local employee channel. Specifically, we find that banks headquartered in regions with a higher proportion of women engage in more interest rate hedging activities, suggesting that greater female participation may help to restrain excessive risk-taking by financial companies. These findings can be valuable in the aftermath of financial crisis.[6] For example, regulations aim at risk management may take the local gender diversity into account.

The remainder of the paper is organized as follows. In Section I, we discuss the data used in the study, our construction of the key variables, and sample statistics. In Section II, we present our main regression results on levels of firm risk and corporate risk-taking activities, such as financial, investment, and hedging policies. In Section III, we examine loan contract terms. In Section IV, we address endogeneity concerns. In Section V, we investigate the economic mechanism underlying the findings. In Section VI, we conclude.

1. Data and Summary Statistics

Our data are collected from multiple sources. Due to data availability, the sample period varies by test specifications; however, we aim to use the longest sample for each test. We provide detailed definitions of variables in Appendix Table A1.

1.1. County-level demographic characteristics

We first collect geographical and demographic information at the county level from the U.S. Census Bureau for the 1992–2017 period, including the local male–female ratio (our main variable of interest) and other county characteristics, such as the rates of higher education, unemployment, population, household income, and average age. We restrict the male–female ratio to the prime work age population (i.e., people aged 20 to 64 years), because these individuals are the most active participants in the stock and labor markets and therefore are more likely to affect corporate decisions.[7] The data for the local female-male income ratio are from the U.S. Census Bureau and Bureau of Labor Statistics. We collect breast cancer and prostate cancer mortality data from the Global Health Data Exchange.[8] We obtain data on local religiosity from the "Churches and Church Membership" files in the American Religion Data Archive (ARDA).

1.2. County-level risk attitudes

To test the local risk attitudes embedded in gender differences, we obtain data on local financial and living risk attitudes, and overconfidence from GSS conducted by the National Opinion Research Center at the University of Chicago.

The 1993 GSS included the following item which was related to local attitudes towards financial risk aversion: "Some people say that this is very important to them. Others say that it is not as important. Please tell me how important being financially secure is." This item is scored on a 5-point scale: 1, "It is a top priority"; 2, "It is very important"; 3, "It is somewhat important"; 4, "It is not as important"; and 5, "It is not important at all." A higher score indicates a lower level of risk aversion.

The 2008 GSS included the following item which was related to attitudes towards living security: "Have you or has anyone you know purchased items that provide a sense of safety (gas masks, duct tape, items that enhance home security, etc.)?" This item is scored on a 4-point scale: 0, "No"; 1, "Yes, the respondent has purchased such items;" 2, "Yes, someone the respondent knows has purchased such items;" and 3, "Yes, both the respondent and someone the respondent knows have purchased such items." To render this score consistent with the financial risk measure, we calculate it as 6 minus the GSS score. Therefore, a higher score for financial risk or living risk indicates a less risk-averse respondent. We compute the local risk aversion measure as a county's average score on these items.

The 2016 GSS included four items which were related to confidence: "In uncertain times, I usually expect the best," "I'm always optimistic about my future," "If something can go wrong for me, it will," and "I rarely count on good things happening to me." Each item is scored on a 5-point scale: 1, "Strongly disagree"; 2, "Disagree"; 3, "Neutral"; 4, "Agree"; and 5, "Strongly agree." The former two items represent confidence, whereas the latter two represent a lack of confidence. To be consistent, we calculate the confidence score as 6 minus the GSS score for each of the latter two items. Therefore, a higher score indicates a higher level of confidence. We then take the average score for each item and aggregate it at the county level as the local overconfidence measure.

After merging the local financial and living risk attitudes and local overconfidence from GSS with county characteristics and firm characteristics, we obtain 81, 123 observations.

[6] Christine Lagarde, managing director of IMF, said "Female leaders pay attention to risk, which is the reason why I think women are good leaders in times of crisis". See https://www.inc.com/will-yakowicz/christine-lagarde-on-the-female-leader.html.

[7] Our results are both qualitatively and quantitatively similar when we include older local residents (aged > 64 years).

[8] We use the table "Trends and patterns of disparities in cancer mortality among US counties, 1980–2014." and replace the missing observations after 2014 with observations from 2014.

1.3. Firm-level data

Due to a lack of data for firms' operation locations or branches, we follow most location-based studies to assign firms to counties and states by the location of their headquarters (Kumar et al., 2011; Becker, Ivković, and Weisbenner, 2011).[9] We use web-crawling algorithm to identify annual headquarter locations from firms' 10-K filings through the Securities and Exchange Commission's Electronic Data Gathering and Retrieval (EDGAR) database.

Our initial sample focuses on firms' risk levels and policies. We combine the dataset of local demographic characteristics with accounting information from Compustat and daily stock return information from the Center for Research in Security Prices (CRSP). The main sample includes 14,342 county-year observations and 83,059 firm-year observations.

To collect corporate interest rate hedging information, we review firms' 10-K filings from EDGAR and search keywords related to the use of interest rate derivatives. A firm is considered to be an interest rate hedger in a given year if its 10-K files indicate that it uses an interest rate derivative. We then merge our interest rate hedging dataset with local demographic characteristics and focus our analysis on industrial firms, yielding 45,830 firm-year observations.

We merge our initial sample with the DealScan database (provided by the Reuters Loan Pricing Corporation, LPC) to obtain information on loan spreads, collateral requirements and loan-specific information, such as the facility amounts, loan maturity levels, loan types, and loan purposes, generating 10,844 loan-level observations during the 1992–2007 period. We then combine the LPC data with the dataset used by Nini, Smith, and Sufi (2009) to obtain information on capital expenditure restrictions, which gives us 2,585 observations during 1996–2005. We also obtain data on covenant violations during 1996–2008 from Nini, Smith, and Sufi (2009). We combine the Compustat Segments Customer File with the name-gvkey link from Cen, Maydew, Zhang, and Zuo (2017) to identify firms' top five customers. Data on the proportion of female directors (CEOs and directors) are obtained from Execucomp. After merging these data with the main sample and board characteristics, we obtain 9,608 observations. We also use the Geographic Profile of Employment and Unemployment from the Bureau of Labor Statistics to compute the male–female ratio of local employees.

1.4. Summary statistics

Table 1 summarizes the county demographic, firm, bank, and loan characteristics. We find that the average local male–female ratio is 0.940 (i.e., more female than male residents), with a standard deviation of 0.047. The lowest male–female ratio is 0.760, and the highest is 1.846. On average, the local population is 2.557 million, and 31.2% of residents have at least a college degree. The local average age is 35.08 years, and the mean income is US$44,319.[10]

In the sample of firms, the mean book asset value is $2.398 billion, and the average market leverage ratio (total debt/market assets) is 0.126. The average free cash flows, cash holdings, and capital expenditure represent -13.5%, 12.7%, and 5.1% of book assets, respectively. The sample has a mean market-to-book ratio of 1.875 and a profitability of 4.7%. In terms of loan contracts, the sample has a mean loan spread of 1.567% and an average loan maturity of 42.726 months.

2. Local Male–Female Ratio and Firm Risks

This section examines the relationship between local male–female ratio and corporate risk levels and risk-taking policies. We explore the likelihood of using interest rate hedging, which directly smooths cash flows and helps firms manage risk. We also examine other corporate policies used to curb risk, such as investment conservatism (capital expenditure) and financial conservatism (market leverage and cash holdings).

2.1. Local male–female ratio and firm risk levels

We first investigate corporate risk level, which is measured as option-implied stock return volatility. This measure is forward-looking, enabling us to build a direct link between the expected firm risk level and future corporate financial policies.

Table 2 reports the results of panel regressions of corporate risk levels on the local male–female ratio, controlling for other county and firm characteristics. Standard errors are adjusted for heteroskedasticity and clustered by firms. We use a 182-day option-implied volatility as the dependent variable. In Table 2, regressions (1) to (4) show that the local male–female ratio is positively correlated with a firm's option-implied volatility. For example, in regression (3), the coefficient of the local male–female ratio is 0.252. The unconditional mean of option-implied volatility is 0.160, implying that a one standard deviation increase in the local male–female ratio increases a firm's stock volatility by approximately 7.4% ($0.252 \times 0.047 / 0.160$). Overall, Table 2 suggests a positive correlation between the local male–female ratio and the expected firm risk level.

[9] Large publicly listed firms tend to have multiple operations and branches outside their headquarters, which makes our estimates of local male-female ratio less precise for such firms. We expect that this issue should be minor for smaller firms and our results should be more pronounced among smaller firms. We verify this prediction in Panel A of Table 9, where we interact the local male-female ratio with firm size (see more discussions in Section V.B). We thank the referees for the suggestion.

[10] Appendix Table A2 reports the summary statistics for the location-based variables in the original samples and subsamples used in different tests.

Table 1
Summary Statistics
This table presents the summary statistics for the main variables. We report the mean, median, minimum, maximum, and standard deviation for each variable. See the Appendix Table A1 for variable definitions and Section I for the data sources.

Variable	N	Mean	Min	Max	Std. Dev.
Local male-female ratio	83,059	0.940	0.760	1.846	0.047
County characteristics					
Local higher education proportion	83,059	0.312	0.055	0.716	0.096
Local household income (dollars in thousands)	83,059	44.319	26.676	70.160	10.070
Local population (in millions)	83,059	2.557	0.035	19.699	3.615
Local average age	83,059	35.080	26.500	44.100	2.281
Local unemployment rate	83,059	0.055	0.009	0.179	0.021
Local male-female ratio of employment	57,126	1.180	0.842	1.473	0.092
Local overconfidence	158	3.510	2.000	4.500	0.396
Local financial risk preference	81	1.950	1.000	4.000	0.412
Local preference of living risk	123	0.579	0.000	1.000	0.203
Local prostatic cancer mortality rate (per 100,000)	83,059	30.953	10.167	71.506	6.609
Local breast cancer mortality rate (per 100,000)	83,059	77.382	39.344	173.995	12.946
Firm characteristics					
Book value (dollars in billions)	83,059	2.398	0.002	53.423	7.436
Book leverage	83,059	0.167	0.000	0.721	0.185
Capital expenditure	83,059	0.051	0.000	0.358	0.062
Cash holdings	83,059	0.127	0.000	0.844	0.166
Free cash flow	83,059	-0.135	-1.448	0.146	0.241
Interest rate hedging (industrial)	45,830	0.262	0.000	1.000	0.442
Market leverage	83,059	0.126	0.000	0.651	0.156
Option-implied stock volatility (%)	19,479	0.160	0.014	0.740	0.140
Profitability	83,059	0.047	-1.086	0.432	0.203
Sales growth	83,059	0.211	-0.563	2.423	0.499
Tangibility	83,059	0.252	0.000	0.903	0.246
Market-to-book	83,059	1.875	0.198	13.164	2.022
Covenant violation	48,345	0.130	0.000	1.000	0.337
Fraction of female directors	27,142	0.053	0.000	1.000	0.118
Fraction of female CEOs and directors	27,142	0.051	0.000	1.000	0.105
CEO overconfidence	527	0.610	0.000	1.000	0.487
Loan characteristics					
Loan spread (%)	10,844	1.567	0.175	6.050	1.169
Ln (loan facility amount)	10,844	4.859	0.693	8.007	1.590
Collateral requirement	10,844	0.381	0	1	0
Loan maturity (months)	10,844	42.726	3.000	101.200	23.060
Capital expenditure restriction	2,585	0.294	0	1	0

2.2. Local male–female ratio and corporate risk-taking policies

Next, we investigate a firm's investment and financial conservatism, measured using the firm's market leverage, capital expenditure, cash holdings, and interest rate risk hedging policy. We run panel regressions of these variables on the local male–female ratio, controlling for other county-level demographic characteristics, firm characteristics, and state fixed effects. Results are reported in Table 3. We see that a one standard deviation increase in the local male–female ratio increases a firm's market leverage ratio and cash expenditure by approximately 3.2% (0.085 × 0.047 / 0.126) and 4.9% (0.053 × 0.047 / 0.051), respectively, and decreases its cash holdings by 3.1% (0.084 × 0.047 / 0.127) relative to the sample averages. These results are both statistically significant and economically substantial,[11] consistent with the view that an increase in the local male–female ratio encourages firms to adopt riskier financial and investment policies.

Earlier studies find that firms use derivatives to manage risk. According to Guay (1999), for example, initiating derivative contracts reduces a firm's earnings volatility and stock price volatility. Campello et al. (2011) show that derivative hedging has a significant impact on a firm's value and debt capacity. Interest rate derivatives are the most commonly used instruments for corporate hedging purposes. Therefore, we use interest rate derivatives as a proxy for a firm's hedging activities. This is measured by a dummy variable which equals one if the firm uses interest rate derivatives, and zeros otherwise. In Table 3, regression (4) shows that the local male–female ratio has a marginal effect of -0.259, indicating that a one standard deviation increase in the local male–female ratio decreases the likelihood of corporate interest rate hedging by 4.65% (0.259 × 0.047 / 0.262) relative to the sample average. The coefficients of other control variables are in line with previous papers. For example, increases in firm size and maturity are associated with a higher probability of interest rate hedging.

[11] We control for the lagged market leverage in regression (1), because Lemmon, Roberts, and Zender (2008) show that firms' capital structure decisions tend to be strongly serially correlated and suggest accounting for lagged dependent variables in the regressions of capital structure.

Table 2
Local Male–Female Ratio and Stock Return Volatility
This table reports panel regressions of firms' option-implied stock return volatility against the local male–female ratio. The dependent variable is option-implied volatility, estimated as the 182-day forward-looking volatility from options. Regression (2) controls for county characteristics. Regression (3) adds industry fixed effects. Regression (4) controls for state fixed effects. All regressions include other local population characteristics and firm characteristics as additional controls. The *t*-statistics in parentheses are adjusted for heteroskedasticity and clustered within firms. ***, **, and * represent significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)
Local male-female ratio	0.333***	0.316***	0.252***	0.107***
	(12.19)	(9.28)	(7.32)	(3.39)
County characteristics				
Local higher education proportion		0.090***	0.063***	0.064***
		(6.07)	(4.54)	(3.97)
Ln (local population)		0.003***	0.003***	0.001
		(2.58)	(2.77)	(0.76)
Ln (local household income)		-0.029***	-0.015	-0.141***
		(-2.81)	(-1.51)	(-6.08)
Local unemployment rate		-0.091	-0.199**	-0.306***
		(-0.89)	(-2.06)	(-2.89)
Local average age		-0.011	-0.003	0.020
		(-0.39)	(-0.11)	(0.20)
Firm characteristics				
Tangibility	-0.058***	-0.052***	-0.035***	-0.032***
	(-10.83)	(-9.42)	(-4.41)	(-3.96)
Ln (book assets)	-0.033***	-0.033***	-0.032***	-0.031***
	(-35.55)	(-35.85)	(-35.70)	(-35.02)
Market leverage	0.080***	0.081***	-0.014*	-0.009
	(10.06)	(10.10)	(-1.81)	(-1.20)
Free cash flow	-0.050***	-0.049***	-0.045***	-0.045***
	(-3.63)	(-3.64)	(-3.40)	(-3.47)
Market-to-book	0.004***	0.004***	0.009***	0.009***
	(6.25)	(6.18)	(11.44)	(11.21)
Profitability	-0.179***	-0.177***	-0.192***	-0.187***
	(-11.52)	(-11.47)	(-13.58)	(-13.29)
Sales growth	0.000	0.000	0.000	0.000
	(1.02)	(1.19)	(1.27)	(1.20)
Year fixed effects	Yes	Yes	Yes	Yes
Industry effects	No	No	Yes	Yes
State fixed effects	No	No	No	Yes
Observations	17,936	17,936	17,936	17,936
Adjusted R^2	0.548	0.551	0.585	0.592

In Appendix Table A3, we perform robustness checks to examine the hedging policies of bank holding companies. This sample has some advantages. First, bank holding companies are required to report separately their use of derivatives for trading and hedging purposes. Second, banks' Y-9C reports enable us to use the exact notional values of interest rate derivatives, rather than an indicator. Following Bonaimé, Hankins, and Harford (2014), we measure bank interest rate hedging as the gross notional value of interest rate derivatives for non-trading purposes, scaled by market capitalization. In regression (3), the results show that a one standard deviation increase in the local male–female ratio is associated with a 9.50% ($0.341 \times 0.047/0.169$) decrease in bank interest rate hedging relative to the sample mean.

3. Consequences of Catering to Local Risk Attitudes: Loan Contracts

In the previous section, we document consistent evidence that firms based in areas with a higher male–female ratio are more likely to adopt riskier corporate policies and exhibit higher risk levels. In this section, we further investigate the ex ante value implications of corporate risk-taking as a reflection of local gender differences. Specifically, we examine the loan contract terms. We also study the ex post impacts of local gender imbalance, i.e., covenant violations.

3.1. Local male–female ratio and loan spreads

We first examine the cost of debt. If firms based in areas with a higher local male–female ratio take more risks, then they should face higher borrowing costs.

We run panel regressions in which the dependent variable is the loan spread charged by the bank over the London Inter-Bank Offered Rate (LIBOR). Following Graham, Li, and Qiu (2008), we control for a set of firm characteristics associated with a firm's cost of debt, such as book assets, market leverage, tangibility, market-to-book ratio, free cash flows, and credit rating

Table 3
Local Male–Female Ratio and Corporate Policies
This table reports panel regressions of firms' financial/investment policies against the local male–female ratio. Corporate financial/investment policies are represented by a firm's market leverage, capital expenditure, and cash holdings in regressions (1)–(3), respectively. Regression (4) presents a Probit regression of firm interest rate hedging against the local male–female ratio and includes its marginal effect. The dependent variable is an indicator that equals one if the firm reports the use of interest rate derivatives in its annual report, and zero otherwise. All regressions include other local population characteristics and firm characteristics as additional controls. The *t*-statistics in parentheses are adjusted for heteroskedasticity and clustered within firms. ***, **, and * represent significance at the 1%, 5%, and 10% levels, respectively.

	Market Leverage (1)	Capital Expenditure (2)	Cash Holdings (3)	Interest Rate Hedging (4)
Local male-female ratio	0.085***	0.053*	-0.084***	-1.136**
	(3.80)	(1.70)	(-3.06)	(-1.97)
County characteristics				
Local higher education proportion	0.006	0.009*	0.109***	-0.602***
	(0.63)	(1.83)	(7.69)	(-2.60)
Ln (local population)	0.000	0.001**	-0.003***	0.021
	(0.38)	(2.09)	(-3.02)	(1.11)
Ln (local household income)	0.018*	-0.008	0.027**	-0.263
	(1.82)	(-1.41)	(2.01)	(-0.99)
Local unemployment rate	-0.112**	-0.059**	-0.063	-3.278***
	(-2.25)	(-2.25)	(-0.96)	(-2.67)
Local average age	0.008	0.036	-0.012	2.585**
	(0.17)	(1.11)	(-0.19)	(2.35)
Firm characteristics				
Tangibility	0.085***	0.172***	-0.147***	0.135
	(17.72)	(45.20)	(-25.95)	(1.43)
Ln (book assets)	0.005***	-0.000*	-0.012***	0.320***
	(13.71)	(-1.67)	(-19.10)	(32.17)
Market leverage	0.450***	-0.045***	-0.129***	1.323***
	(88.18)	(-21.88)	(-26.23)	(19.75)
Free cash flow	0.022***	-0.006	-0.065***	0.194**
	(7.26)	(-1.29)	(-6.46)	(2.26)
Market-to-book	0.001***	0.001***	0.008***	-0.031***
	(4.38)	(4.51)	(6.16)	(-2.59)
Profitability	-0.005**	0.012***	-0.039***	0.936***
	(-2.04)	(3.08)	(-2.69)	(6.47)
Sales growth	0.000	0.000*	0.000	0.000*
	(1.02)	(1.70)	(0.45)	(1.83)
Marginal effect of local male-female ratio				-0.259
Year fixed effects	Yes	Yes	Yes	Yes
Industry effects	Yes	Yes	Yes	Yes
State fixed effects	Yes	Yes	Yes	Yes
Observations	83,059	83,059	83,059	45,830
Adjusted R^2	0.610	0.366	0.348	0.293

fixed effects. All of the regressions also control for loan-specific characteristics, such as loan facility values, loan maturity levels, loan type fixed effects, and loan purpose fixed effects.

The results are presented in regressions (1)–(4), Panel A of Table 4 . The estimated coefficient for the local male–female ratio is positive, suggesting that a higher local male–female ratio is associated with the higher cost of bank loans.

3.2. Local male–female ratio and collateral requirements

The literature finds that collateral requirements are associated with riskier borrowers (Berger and Udell, 1990; John, Lynch, and Puri, 2003). When firms increase risk-taking in response to lower local risk aversion levels, as proxied by a higher male–female ratio, the probability that their loan contracts require collaterals may increase. In this subsection, we test this prediction using a Probit regression, in which the dependent variable is an indicator that equals one when the bank loan is secured by collaterals, and zero otherwise.

The results are shown in regressions (5)–(8), Panel A of Table 4. Consistent with the above prediction, we see that the coefficient of the local male–female ratio is positive and significant. In regression (8), the marginal effect of the local male–female ratio is 0.0222 (0.482 × 0.046), indicating that a one standard deviation increase in this ratio increases the probability of using collaterals as a non-price term of loans by roughly 5.8% (the sample average for collateral requirements is approximately 38.1%).

Table 4
Local Male–Female Ratio and Debt Financing Conditions
This table presents regressions of debt financing conditions on the local male–female ratio. Panel A considers loan spread, collateral requirement, and capital expenditure restrictions. Regressions (1)–(4) show the results of panel regressions of loan spread, which is charged by the bank over LIBOR. Regressions (5)–(8) are the Probit regressions of collateral requirement, an indicator that equals one if the bank loan is secured by collaterals, and zero otherwise. Regressions (9)–(12) are the Probit regressions of capital expenditure restriction, an indicator that equals one if the bank loan contains a capital expenditure restriction, and zero otherwise. Panel B reports the Probit regressions of covenant violations, in which the dependent variable is an indicator that equals one if the firm violates a covenant in a specific year. We report the marginal effect of the male–female ratio from those Probit regressions. All of the independent variables are measured as of the fiscal year-end that immediately precedes the loan active date or the covenant violation event. The *t*-statistics in parentheses are adjusted for heteroskedasticity and clustered within firms. ***, **, and * represent significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Local Male-Female Ratio and Ex Ante Contract Terms

	Loan Spread				Collateral Requirement				Capital Expenditure Restriction			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Local male-female ratio	1.139***	0.907***	0.819**	0.366	2.764***	2.334***	2.227***	1.882***	2.728***	3.443***	4.034***	3.091**
	(4.71)	(2.96)	(2.57)	(1.05)	(7.55)	(5.24)	(4.85)	(3.41)	(3.02)	(3.02)	(3.48)	(2.03)
County characteristics										-0.320	-0.283	0.386
Local higher education proportion		0.364***	0.320**	0.242		0.463**	0.577**	0.497*		(-0.62)	(-0.53)	(0.60)
		(2.68)	(2.23)	(1.42)		(2.09)	(2.55)	(1.79)		0.078**	0.067*	0.003
Ln (local population)		0.010	-0.001	-0.003		0.026	0.011	0.007		(2.23)	(1.76)	(0.06)
		(1.05)	(-0.05)	(-0.27)		(1.53)	(0.62)	(0.33)		-0.475	-0.752*	-2.404**
Ln (local household income)		-0.084	-0.008	-0.311		-0.521***	-0.386**	0.482		(-1.33)	(-1.91)	(-2.16)
		(-0.93)	(-0.09)	(-1.27)		(-3.29)	(-2.39)	(1.22)		2.133	4.916	3.499
Local unemployment rate		1.537*	1.573**	1.617*		-0.268	0.249	0.335		(0.62)	(1.36)	(0.82)
		(1.94)	(1.96)	(1.86)		(-0.20)	(0.18)	(0.21)		1.060	-0.065	-1.030
Local average age		-0.351	-0.416	0.179		-0.797*	-0.556	-1.498		(1.06)	(-0.06)	(-0.30)
		(-1.31)	(-1.50)	(0.17)		(-1.80)	(-1.20)	(-0.97)		-0.320	-0.283	0.386
Firm characteristics												
Tangibility	-0.190***	-0.171***	-0.481***	-0.496***	-0.020	-0.040	-0.379***	-0.406***	-0.457**	-0.490**	-0.158	-0.260
	(-4.12)	(-3.57)	(-6.92)	(-7.16)	(-0.25)	(-0.48)	(-3.22)	(-3.47)	(-2.47)	(-2.53)	(-0.53)	(-0.86)
Ln (book assets)	-0.151***	-0.155***	-0.146***	-0.146***	-0.244***	-0.246***	-0.257***	-0.259***	-0.202***	-0.212***	-0.272***	-0.265***
	(-9.50)	(-9.45)	(-8.74)	(-8.79)	(-8.41)	(-8.35)	(-7.89)	(-8.16)	(-3.57)	(-3.70)	(-4.51)	(-4.42)
Market leverage	1.024***	1.035***	1.237***	1.228***	1.002***	1.023***	1.050***	1.018***	0.493**	0.461**	0.440*	0.557**
	(18.59)	(18.77)	(20.59)	(20.49)	(11.53)	(11.71)	(11.01)	(10.63)	(2.14)	(2.00)	(1.73)	(2.14)
Free cash flow	-2.545***	-2.490***	-2.202***	-2.216***	-1.199***	-1.174***	-1.018***	-1.051***	-0.912	-1.002	-1.343*	-1.095
	(-13.71)	(-13.24)	(-11.34)	(-11.49)	(-5.07)	(-4.91)	(-3.85)	(-3.96)	(-1.35)	(-1.47)	(-1.75)	(-1.40)
Market-to-book	0.015**	0.014**	0.018**	0.017**	0.006	0.005	0.005	0.005	-0.070	-0.072	-0.087	-0.065
	(2.14)	(2.01)	(2.53)	(2.49)	(0.49)	(0.39)	(0.34)	(0.41)	(-0.99)	(-1.01)	(-1.17)	(-0.85)
Profit	-0.844***	-0.837***	-0.864***	-0.850***	-0.868***	-0.869***	-1.098***	-1.129***	-0.806	-0.778	-1.023	-1.297*
	(-6.63)	(-6.57)	(-6.86)	(-6.84)	(-4.14)	(-4.09)	(-5.34)	(-5.49)	(-1.24)	(-1.20)	(-1.45)	(-1.79)
Sales growth	-0.001*	-0.001	-0.001	-0.001	0.019	0.018	0.054	0.044	-0.016	-0.016	-0.007	-0.012
	(-1.66)	(-0.97)	(-1.19)	(-1.28)	(1.08)	(1.02)	(1.59)	(1.37)	(-0.83)	(-0.89)	(-0.82)	(-0.54)
Ln (facility amount)	-0.160***	-0.161***	-0.202***	-0.200***	-0.054*	-0.059*	-0.074**	-0.073**	0.014	0.023	0.061	0.068
	(-9.96)	(-9.76)	(-12.59)	(-12.48)	(-1.79)	(-1.92)	(-2.20)	(-2.21)	(0.28)	(0.44)	(1.10)	(1.23)
Ln (maturity)	-0.137***	-0.133***	0.001	-0.001	-0.014	-0.004	0.001	-0.001	0.054	0.055	0.068	0.049
	(-6.89)	(-6.65)	(0.08)	(-0.05)	(-0.44)	(-0.12)	(0.02)	(-0.04)	(0.61)	(0.62)	(0.72)	(0.50)
Marginal effects of local male-female ratio								0.482				0.678
Loan type fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Loan purpose fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

(*continued on next page*)

Table 4 (*continued*)

Panel A: Local Male-Female Ratio and Ex Ante Contract Terms

	Loan Spread				Collateral Requirement				Capital Expenditure Restriction			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Credit rating fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	No	No	Yes	Yes	No	No	Yes	Yes	No	No	Yes	Yes
State fixed effects	No	No	No	Yes	No	No	No	Yes	No	No	No	Yes
Observations	10,844	10,844	10,844	10,844	10,844	10,844	10,844	10,844	2585	2585	2585	2585
Adjusted/Pseudo R^2	0.551	0.552	0.557	0.563	0.353	0.355	0.372	0.377	0.250	0.253	0.315	0.350

Panel B: Local Male-Female Ratio and Ex Post Covenant Violations

	(1)	(2)	(3)	(4)
Local male-female ratio	1.526***	1.414***	1.224***	0.747*
	(5.94)	(4.47)	(3.75)	(1.79)
County characteristics				
Local higher education proportion		0.195	0.181	0.031
		(1.47)	(1.31)	(0.20)
Ln (local population)		0.014	0.017	0.002
		(1.35)	(1.60)	(0.13)
Ln (local household income)		-0.095	-0.079	-0.250
		(-0.94)	(-0.77)	(-0.97)
Local unemployment rate		-1.349	-1.570*	-2.481**
		(-1.53)	(-1.78)	(-2.57)
Local average age		-0.090	-0.166	0.399
		(-0.33)	(-0.60)	(0.38)
Firm characteristics				
Tangibility	-0.353***	-0.328***	-0.113	-0.103
	(-6.94)	(-6.32)	(-1.63)	(-1.48)
Ln (book assets)	-0.141***	-0.142***	-0.138***	-0.136***
	(-22.44)	(-22.62)	(-20.74)	(-20.08)
Market leverage	1.483***	1.487***	1.553***	1.577***
	(32.01)	(31.99)	(30.67)	(30.96)
Free cash flow	-0.417***	-0.404***	-0.323***	-0.307***
	(-7.01)	(-6.79)	(-5.02)	(-4.85)
Market-to-book	-0.083***	-0.084***	-0.078***	-0.080***
	(-9.70)	(-9.81)	(-8.86)	(-9.10)
Profit	0.398***	0.399***	0.291***	0.299***
	(9.02)	(9.03)	(4.82)	(6.38)
Sales growth	0.000**	0.000**	0.000**	0.000**
	(2.24)	(2.24)	(2.08)	(2.13)
Marginal effects of local male-female ratio			0.299	
Credit rating fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Industry fixed effects	No	No	Yes	Yes
State fixed effects	No	No	No	Yes
Observations	48,345	48,345	48,345	48,345
Adjusted/Pseudo R^2	0.106	0.106	0.113	0.116

3.3. Local male–female ratio and capital expenditure restrictions

Nini, Smith, and Sufi (2009) suggest that creditors are more likely to impose capital expenditure restrictions as a borrower's credit quality deteriorates. Therefore, we expect that firms based in areas with a high male–female ratio are more likely to face capital expenditure restrictions in bank loan contracts due to their higher level of risk.

We perform Probit regressions in which the dependent variable is an indicator that equals one when the bank loan imposes capital expenditure restrictions, and zero otherwise. The results are presented in regressions (9)–(12), Panel A of Table 4. In each regression, the coefficient of the local male–female ratio has a positive sign and is significant at least at the 5% level. As shown in regression (12), the marginal effect of the local male–female ratio is 0.678. This implies that a one standard deviation increase in this ratio increases the probability of capital expenditure restrictions by 2.92% (0.678 × 0.043). As the sample average likelihood of capital expenditure restrictions is 29.4%, the effect of the local male–female ratio accounts for 9.9% of the sample mean.

3.4. Local male–female ratio and covenant violations

We further examine firms' ex post covenant violations. Jensen and Meckling (1976) suggest that firms that take more risks are more likely to violate loan covenants.

Regressions (1)–(4) in Panel B of Table 4 are Probit regressions in which the dependent variable is an indicator that equals one when the firm violates a bank loan covenant in a specific year and zero otherwise. In regression (1), we control for the local male–female ratio and firm characteristics. In regression (2), we control for other county-level demographic characteristics. In regressions (3) and (4), we control for industry and state fixed effects, respectively.

As expected, throughout all regressions, the coefficient of the local male–female ratio is significantly positive. In regressions (3), the marginal effect of this ratio is 0.299, suggesting that a one standard deviation increase increases the likelihood of covenant violations by 0.014 (=0.299*0.047), accounting for 10.8% of the sample mean of the likelihood of covenant violations (0.13).

4. Robustness Checks and Endogeneity Tests

We perform a series of additional tests to ensure that the positive relationship between the local male–female ratio and corporate risk-taking is robust to alternative samples and model specifications, and also address the endogeneity concerns. First, we explore subsamples with various degrees of cross-county gender ratio variations. Second, we consider potential issues of omitted variables. Third, we address concerns of reverse causality. Last, we use the instrumental variable approach and run two-stage least squares (2SLS) regressions to further address the causality issue.

4.1. Examining different gender ratio variations

Our analyses in previous sections focus on local male–female ratio and corporate policies. Still, it remains unclear whether cross-county variations in gender ratios can generate sizable effects. We address this concern by reexamining the significance of the local male–female ratio over some subsamples in Table 5. Specifically, in each year, we intentionally exclude counties in the left and right tails of the cross-county gender ratio distribution (i.e., the extreme counties). For example, the 5–95 percentile subsample only includes counties with a male–female ratio falling between the 5^{th} and 95^{th} percentiles of the cross-county distribution. In this analysis, we observe significant results similar to those reported before. If we further shrink the test sample to the 15–85 percentile subsample (a cross-county standard deviation of 0.028) by excluding counties both in the top and bottom 15% of counties, the gender ratio remains significant in most regressions. The results also remain reasonably significant once we exclude the top and bottom 20% of all counties (i.e., 40% of the sample). Overall, the results hold after using several thresholds to exclude the extreme counties.

In addition, as expected, the significance of the local gender ratio increases in regressions over the subsample of extreme counties. For example, this ratio is strongly significant if we analyze only counties in the top and bottom 20% of the local male–female ratio distribution (i.e., the subsample with large variations). This suggests that as variations in the local male–female ratio increase, our results become both statistically more significant and economically more relevant.

4.2. Omitted variables and reverse causality

We perform extensive robustness checks to address potential issues involving omitted variables. First, variations in industry may contribute to the correlation between the local male–female ratio and corporate risk-taking, because different industries have systematic differences in the shares of male and female employees (e.g., the mining industry has a higher proportion of male employees than the retail industry). Changing conditions in an industry can reflect labor movement across counties, which might affect the male–female ratio in local communities. To the extent that the industry-time trend affects local firms' risk-taking behavior, the relation between the local male–female ratio and firms' risk taking may capture such industry-time variations. Although we control for industry fixed effects in the main specification in the previous tables,

Table 5

Reexamining the Significance of the Male–Female Ratio: Subsample Analysis

This table re-examines the significance of the male–female ratio in some subsamples. In each year, we exclude counties in the left and right tails of the cross-county gender ratio distribution. For example, the 20–80 percentile subsample only includes counties in the 20–80% range of cross-county gender ratios. For simplicity, we do not report the coefficients of the control variables. We report the range, mean, and standard deviation of the male–female ratio for each subsample. All regressions include other local population characteristics and firm characteristics as additional controls. The *t*-statistics in parentheses are adjusted for heteroskedasticity and clustered within firms. ***, **, and * represent significance at the 1%, 5%, and 10% levels, respectively.

Range of male-female ratio	Mean	Std. Dev.	Option-Implied Volatility (1)	Market Leverage (2)	Capital Expenditure (3)	Cash Holdings (4)	Interest Rate Hedging (5)	Loan Spread (6)	Collateral Requirement (7)	Capital Expenditure Restriction (8)	Covenant Violation (9)
5-95 percentile	0.941	0.035	0.242***	0.104***	0.052**	-0.091**	-1.992***	0.778**	2.258***	3.187**	1.164***
(0.859-1.124)			(7.14)	(3.91)	(1.98)	(-2.54)	(-4.33)	(2.36)	(4.34)	(2.57)	(3.52)
10-90 percentile	0.941	0.033	0.250***	0.069**	0.028*	-0.101**	-1.737***	0.761**	2.470***	3.003**	1.237***
(0.879-1.041)			(6.82)	(2.33)	(1.87)	(-2.43)	(-3.53)	(2.20)	(4.18)	(2.23)	(3.62)
15-85 percentile	0.939	0.028	0.134***	0.069*	0.038	-0.154***	-1.493**	0.681*	1.368*	4.108***	1.423***
(0.892-1.004)			(2.66)	(1.80)	(1.31)	(-3.03)	(-2.21)	(1.66)	(1.81)	(2.62)	(3.19)
20-80 percentile	0.940	0.023	0.090*	0.067	0.046*	-0.163**	-1.783*	0.063	1.743*	2.212	1.259**
(0.908-0.991)			(1.85)	(1.57)	(1.61)	(-2.29)	(-1.92)	(0.10)	(1.67)	(1.05)	(2.33)
$<$20% & $>$80% percentile	0.958	0.089	0.304***	0.081***	0.064*	-0.120***	-2.125***	1.390***	2.757***	5.114***	1.037***
			(7.21)	(2.79)	(1.85)	(-3.23)	(-4.00)	(3.22)	(4.71)	(3.11)	(2.58)
County characteristics			Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm characteristics			Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
All relevant controls			Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects			Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects			Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

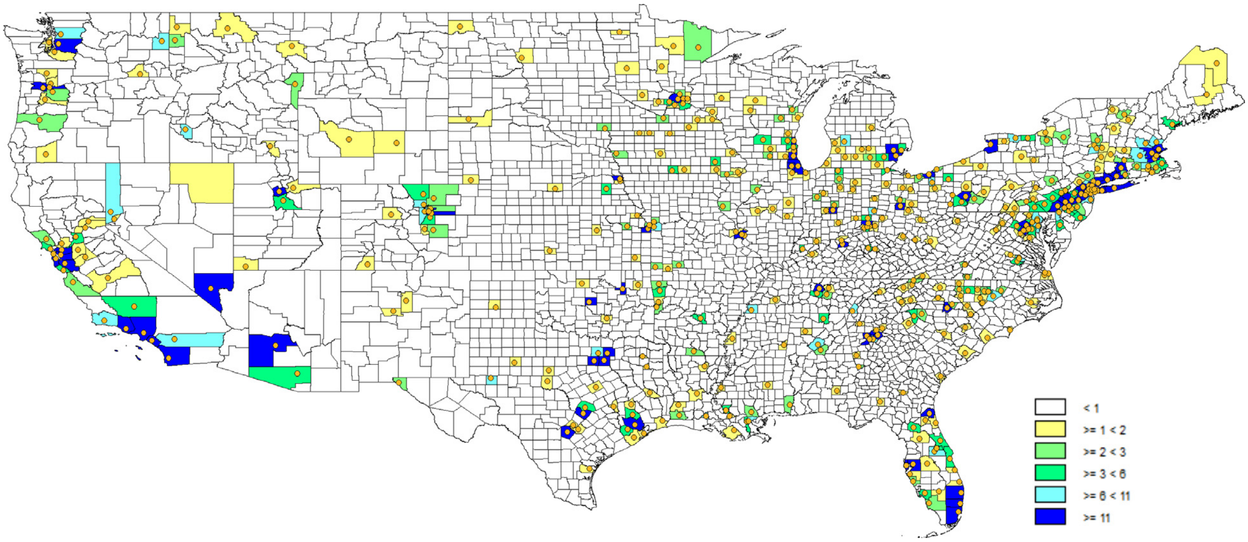

Figure 2. Geographical Distribution of Firm Headquarters
This figure plots the geographical distribution of firm headquarters across counties in the United States in 2005.

to further address this concern, we add the interaction term of industry and year fixed effects to absorb the time trend at the industry level. We see robust results, as shown in Panel A of Appendix Table A4.

Next, we further consider county fixed effects. That is, we identify the effects of the local male–female ratio based on time-series variations within the county where the company is headquartered, controlling for all other firm-specific factors that may vary over time. This helps to address the concern that our findings are spurious and driven by county-level, time-invariant omitted variables (e.g., geographic and cultural factors). Panel B of Appendix Table A4 shows that for most of the regressions, the results are still significant after including the county-level fixed effect.

We also control for the local retiree population. Areas in the Southwest and the state of Florida might attract more retirees. As women have longer lifespans, on average, we expect that these areas will have lower male–female ratios. Retirees might affect local firms through various channels, such as local consumption demand and savings. Therefore, we control for the county-level proportion of retirees (the population that is above the retirement age, $>$ 60 years). Panel C of Appendix Table A4 shows that our results are not affected by this variable.

Third, corporate headquarters might cause labor forces to migrate across counties, leading to changes in local male–female ratios and affecting our results. Fig. 2 plots the geographical distribution of firm headquarters in 2005. We find that the correlation coefficient between the local male–female ratio and the fraction of firm headquarters is merely -0.011, which may partially address this possible concern. We further address this issue by excluding counties for which the local male –female ratio is likely to be driven by local industries. Some counties may specialize in industries that lack gender diversity. For example, Silicon Valley (California) has attracted disproportionally more men than women over the past decades because men are overrepresented in the occupations required by those firms. To the extent that firms headquartered in Silicon Valley attract more male workers, the correlation between increased corporate risk-taking and a higher male–female ratio can be simultaneously determined. To address this concern, we control for industry fixed effects and exclude counties in which the male–female ratio is highly correlated with the local industry male–female ratio. After excluding these counties from the sample, the male–female ratios of the remaining counties are unlikely to be affected by local industrial clusters and labor force mobility. We find that our main findings are robust after excluding these counties, as shown in Appendix Table A5.

Fourth, one might wonder whether the local male–female ratio reflects other local characteristics, such as attitudes toward gender equality or religiosity. A gender-egalitarian culture might affect the local male–female ratio, with subsequent effects on female corporate board representation and, ultimately, corporate risk-taking (e.g., McLean, Pirinsky, and Zhao, 2020). We use labor market outcomes (e.g., the gender pay gap) to capture cultural gender egalitarianism. In a local culture with a higher level of gender egalitarianism, we would expect a higher local female–male income ratio. Local religiosity might also affect corporate activities because more religious populations tend to be more risk averse (Hillary and Hui, 2009). Therefore, we further check our previous results by controlling for the local female–male income ratio and level of religiosity. The results in Appendix Table A6 show that the local male–female ratio remains significant in all regressions, suggesting that our results are not driven by gender egalitarianism or local religiosity.

Finally, local demographic changes might predict local business activities, creating spurious correlations between the local male–female ratio and corporate policies. To address this concern, we consider a subsample of firms whose revenues are mainly from other states (i.e., their top five customers are out of state) and repeat the previous analyses. Again, we find robust evidence that the local male–female ratio affects risk-taking by these firms, as shown in Table 6.

Table 6
Local Male–Female Ratio and Firm Risk: A Subsample of Firms Whose Top Five Customers Are out of State
To avoid the direct impacts of local demographic conditions on local business activities, we restrict the sample to firms whose top five customers are out of state. In regressions (1)–(9), the dependent variables are option-implied volatility, market leverage ratio, capital expenditure, cash holdings, an indicator that equals one if the firm reports the use of interest rate derivatives in its annual report and zero otherwise, the loan spread charged by the bank over LIBOR, an indicator that equals one if the bank loan is secured by collaterals and zero otherwise, an indicator that equals one if the bank loan contains a capital expenditure restriction and zero otherwise, and an indicator that equals one if the firm violates a covenant in a specific year, respectively. The other control variables are the same as those in Tables II–IV. The *t*-statistics in parentheses are adjusted for heteroskedasticity and clustered within firms. ***, **, and * represent significance at the 1%, 5%, and 10% levels, respectively.

	Option-Implied Volatility (1)	Market Leverage (2)	Capital Expenditure (3)	Cash Holdings (4)	Interest Rate Hedging (5)	Loan Spread (6)	Collateral Requirement (7)	Capital Expenditure Restriction (8)	Covenant Violation (9)
Local male-female ratio	0.238***	0.121***	0.054**	-0.156**	-2.956*	1.524*	3.866***	9.528*	1.267**
	(3.03)	(2.81)	(2.20)	(-2.28)	(-2.84)	(1.84)	(2.85)	(1.89)	(2.01)
County characteristics characteristicsRelative controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
All relevant controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2,455	11,947	11,947	11,947	6,164	1,466	1,466	187	6,434
Adjusted/Pseudo R^2	0.636	0.616	0.504	0.360	0.303	0.597	-	-	-

4.3. Endogeneity tests: 2SLS using prostate cancer and breast cancer as instruments

In this subsection, we attempt to address concerns about endogeneity by using instrumental variables and running 2SLS regressions. Endogeneity is a perennial issue that empirical tests can hardly address, and often it is difficult to find natural experiment that can fully nail down the direction of causality. We exploit the death and birth of human beings to construct instrumental variables, as Roberts and Whited (2013) suggest that biological or physical events are more likely than the traditional corporate financial ratios to be good instruments in empirical corporate finance studies. Although the tests can be subject to criticism, the collective evidence in the previous subsection B and this subsection may point to a causal relation going from the local male-female ratio to corporate risk taking.

We use two mortality-related biological factors that may affect the local male–female ratio as instruments. The first is based on breast cancer mortality rates in women. Breast cancer is the most frequently occurring cancer and the most common cause of cancer-related deaths among women. To control for the fact that both men and women can develop breast cancer, we normalize the per-county breast cancer mortality rate in women by that in men and thus ensure that breast cancer has a unidirectional effect on the male–female ratio. We expect that in a region where the local community has a higher ratio of breast cancer mortality in women relative to men, the male population is likely to be larger than the female population. This ratio is unlikely to affect local firms' corporate policies except through the local male–female ratio.

The second instrument is the county-level prostate cancer mortality rate. Prostate cancer is the most common type of cancer affecting men in the US.[12] The local prostate cancer mortality rate can reduce the local male–female ratio, and this instrument satisfies the relation criterion. According to the Center for Disease Control (CDC), gene-related factors affect the occurrence of prostate cancer.[13] Such gene-related prostate cancer is unlikely to affect local companies' policies through any channel other than the local male–female ratio. Therefore, this instrument also satisfies the exclusion condition

Our data on county-level breast cancer and prostate cancer mortality rates are obtained from the Global Health Data Exchange. We present 2SLS regressions with the local breast cancer and prostate cancer mortality rates as instrumental variables in Table 7. In the first-stage regression, we find that the local prostate cancer mortality rate is significantly and negatively correlated with the local male–female ratio, and the local ratio of the breast cancer mortality rate in females over that in males is strongly positively correlated with the local male–female ratio. The weak-instrument test shows a joint *F*-statistic of 311.70, suggesting that the two instrumental variables satisfy the relevance criteria of valid instruments.[14] In the second stage, we find that the instrumented local male–female ratio generally predicts higher corporate risk-taking, except

[12] The American Cancer Society estimated that in 2018, 164,690 men would be newly diagnosed with prostate cancer, 29,430 would die from the disease, and one in every nine men would be diagnosed with this cancer during their lifetimes (see https://www.uclahealth.org/urology/prostate-cancer/what-is-prostate-cancer).

[13] For example, men who have a father, son, or brother who had prostate cancer are at increased risk of getting prostate cancer. Men with three or more first-degree relatives (father, son, or brother) or two close relatives on the same side of the family who have had prostate cancer may have a type of prostate cancer caused by genetic changes that are inherited (see https://www.cdc.gov/cancer/prostate/basic_info/risk_factors.htm).

[14] In column (1) of Table 7 for the 2SLS endogeneity test, the standard deviation is 6.609 for local prostate mortality rate, the coefficient estimate from the first stage is -0.002. For local breast cancer mortality rate, its standard deviation is 12.946, and the coefficient estimate from the first stage is 0.001. Therefore, one standard deviation increase in local prostate (local breast cancer) mortality rate is associated with 0.013 (0.013) increase (decrease) in the local male-female ratio, which represents a sizable variation relative to the standard deviation of 0.047 for the local male-female ratio in the main sample.

Table 7
2SLS Endogeneity Test: Using Local Mortality Rate of Prostatic Cancer and Breast Cancer as Instruments
This table presents the results of two-stage least squares (2SLS) regressions. We use two instruments. The first instrumental variable is the county-level prostate cancer mortality rate. The second instrument is the local breast cancer mortality rate among female residents divided by that among male residents (to control for male residents with breast cancer). Regression (1) shows the first-stage regression, in which the dependent variable is the local male–female ratio. Regressions (2)–(10) show the second-stage regression results, in which the dependent variables are the firm's option-implied volatility, market leverage ratio, capital expenditure, cash holdings, an indicator that equals one if the firm reports the use of interest rate derivatives in its annual report and zero otherwise, the loan spread charged by the bank over LIBOR, an indicator that equals one if the bank loan is secured by collaterals and zero otherwise, an indicator that equals one if the bank loan contains a capital expenditure restriction and zero otherwise, and an indicator that equals one if the firm violates a covenant in a specific year. The other control variables are the same as those in Tables II–IV. The *t*-statistics in parentheses are adjusted for heteroskedasticity and clustered within firms. ***, **, and * represent significance at the 1%, 5%, and 10% levels, respectively.

	Local Male-Female Ratio (1)	Option-Implied Volatility (2)	Market Leverage (3)	Capital Expenditure (4)	Cash Holdings (5)	Interest Rate Hedging (6)	Loan Spread (7)	Collateral Requirement (8)	Capital Expenditure Restriction (9)	Covenant Violation (10)
Local prostatic cancer mortality rate	-0.002***									
	(-19.80)									
Local breast cancer mortality rate	0.001***									
	(27.47)									
Local male-female ratio		0.325***	0.136*	-0.004	-0.278***	-2.476***	1.461***	0.676***	4.625***	1.533***
		(7.46)	(1.72)	(-0.08)	(-2.62)	(-5.84)	(4.09)	(4.05)	(3.55)	(3.83)
County characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
All relevant controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Weak identification test: *F*-statistic	311.70									
Hansen *J* (*p*-value)		0.121	0.200	0.115	0.123	0.384	0.118	0.154	0.429	0.221
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	83,059	17,936	83,059	83,059	83,059	45,830	10,844	10,844	2,585	48,345
Adjusted/Pseudo R^2	0.511	0.570	0.610	0.374	0.347	-	0.587	-	-	-

Table 8
The Local Male–Female Ratio, Local Risk Aversion, and Local Overconfidence
This table reports the results of panel regressions of local risk aversion or overconfidence against the local male–female ratio. We measure local risk aversion in two ways. Panel A uses the local financial risk preference, which is calculated as the county average response to the following item related to financial risk in the 1993 General Social Survey (GSS): "Some people say these things are very important to them. Other people say they are not so important. Please tell me how important being financially secure is." This item is scored on a 5-point scale from 1 to 5. Panel B uses the local preference of living risk, which is calculated as the county average response to the following item related to living security in the 2008 GSS: "Have you, or anyone you know purchased things to make them safer (gas masks, duct tape, things to make their house safer, etc.)?" This item is scored on a 4-point scale from 0 to 3. We convert the responses to these two items so that a higher score indicates lower risk aversion. We then compute the county-level average risk aversion score. Panel C uses local overconfidence, which is calculated as the average of the overconfidence scores on the following four items related to confidence in the 2016 GSS: "In uncertain times I usually expect the best," "I'm always optimistic about my future," "If something can go wrong for me it will," and "I rarely count on good things happening to me." These items are scored using a 5-point scale from 1 to 5. We convert and aggregate the responses to these four items and calculate the county-level average. A higher score indicates greater overconfidence. *t*-statistics are reported in parentheses. *, **, and *** indicate the significance level at 10%, 5%, and 1%, respectively.

	Panel A Financial risk			Panel B Living risk			Panel C Local overconfidence		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
Local male-female ratio	1.817**	1.788**	2.023**	1.458***	0.990**	1.373*	2.120***	1.819**	1.971*
	(2.46)	(2.54)	(2.58)	(3.13)	(2.04)	(1.91)	(2.89)	(2.17)	(1.82)
Local higher education proportion		-0.203	-0.839		-0.244	-0.237		-0.192	-0.121
		(-0.32)	(-0.93)		(-0.96)	(-0.66)		(-0.46)	(-0.23)
Ln (local population)		-0.015	-0.040		-0.012	-0.012		0.008	0.002
		(-0.27)	(-0.47)		(-0.61)	(-0.40)		(0.29)	(0.07)
Ln (local household income)		0.522	-0.723**		0.031	-0.587**		0.313	0.777
		(1.10)	(-2.68)		(0.22)	(-2.03)		(1.40)	(0.96)
Local unemployment rate		-1.412	-5.307		-0.194	-3.624		-2.694	-3.028
		(-0.46)	(-1.55)		(-0.08)	(-0.99)		(-1.25)	(-0.78)
Local average age		0.866	-1.688		-0.670*	-0.023		0.235	1.472
		(0.79)	(-1.48)		(-1.73)	(-0.02)		(0.39)	(1.05)
State fixed effects	No	No	Yes	No	No	Yes	No	No	Yes
Observations	81	81	81	123	123	123	158	158	158
Adjusted R^2	0.054	0.088	0.439	0.086	0.104	0.345	0.037	0.049	0.348

in the regression of capital expenditure. The Hansen *J* statistic (*p*-value) significantly rejects the null of over-identification. Overall, our main results still hold in the 2SLS regressions.[15]

5. Investigating the Economic Mechanism

The above evidence suggests that the local male–female ratio affects corporate risk-taking. We next identify the mechanism through which the risk attitudes of local residents are expressed in corporate decisions. We conduct two mechanism tests. First, we show that the local male–female ratio captures the levels of risk aversion and overconfidence of local residents. Second, in addition to the local investor channel, we identify another direct channel through which the risk preferences of local populations are transmitted into corporate policies: the employee channel.

5.1. Understanding the risk attitudes embedded in gender differences

Gender differences may reflect differences in risk preferences or beliefs. Studies suggest that men are less risk averse and more overconfident than women (Croson and Gneezy, 2009; Falk et al., 2018; D'Acunto, 2020). Therefore, a high local male–female ratio suggests a less risk averse and more overconfident population. We confirm this by examining relevant items taken from the General Social Survey (GSS).

Panels A and B of Table 8 report the panel regression of local risk aversion against the local male–female ratio while controlling for other local characteristics, such as population size, household income, unemployment rate, age, and state fixed effects. Panel A examines aversion to financial risk, and Panel B examines aversion to living risk. Overall, we find that a higher local male–female ratio is associated with lower average levels of risk aversion in the local population. Panel C of Table 8 reports a panel regression of local overconfidence against the local male–female ratio after controlling for other local characteristics. We find that a higher local male–female ratio is associated with greater confidence in a local population.

[15] In Appendix Table A7, we also use the county-level male–female ratio at birth averaged over the 1960s as instrumental variable. The county-level male–female ratio at birth averaged over the 1960s is naturally positively related to the local male-female ratio 30–50 years later (i.e., during 1992–2017, the main sample period of this study). In the US, the natural sex ratio at birth is quite stable and does not appear to be heavily influenced by labor movement, local industry clusters, local economic conditions, or local populations. Therefore, the county-level sex ratio at birth is largely exogenous. Additionally, the local male–female ratio at birth averaged over the 1960s is unlikely to directly affect firms' risk-taking policies during 1992–2017, except through the channel of the local male–female ratio. Again, to rule out the concern that local demographic conditions in the 1960s might predict local business operations in the long term, we restrict our sample to firms that obtain revenue mainly from other states, i.e., whose top five customers are out of state. In all regressions except for the loan spread, the local male–female ratio remains significant at least at the 10% level.

5.2. Identifying the preference transmission mechanism: The investor channel

Local residents might affect corporate decision-making via the investor channel for three reasons. First, large local investors can directly influence corporate decision-making (Becker, Cronqvist and Fahlenbrach, 2011). Second, local retail investors can collectively express their opinions by voting with their feet and influencing stock prices (Kandel, Massa, and Simonov, 2011, Brav, Cain, and Zytnick, 2021). Third, firms often shape their policies to cater to local retail investors' preferences (Becker, Ivković, and Weisbenner, 2011).[16] For example, Manconi and Massa (2013) demonstrate how firms cater to their retail investors' payout preferences. The catering explanation relies on the presence of market frictions such as geographically segmented markets (e.g., in which companies rely on "locals" as their shareholders).

We provide two pieces of evidence to show that local investor clientele effect can explain our findings. Specifically, we follow Becker, Ivković, and Weisbenner (2011) to show that our findings are more pronounced among smaller firms and in counties with fewer firms. The reasons are as follows. Smaller firms are more likely to face geographically segmented markets and hence they are more likely to cater to local retail clienteles. Also, firms located in counties with fewer firms are more likely to attract the attention of local clienteles and satisfy their needs (similar to the "only-game-in-town" effect of Hong, Kubik, and Stein (2008)).

In Panel A of Table 9, we estimate regression models similar to those in Table 7, augmented with the interaction term between the local male–female ratio and the firm size. We report the regression results for option-implied volatility, market leverage ratio, capital expenditure, cash holdings, an indicator that equals to one if the firm reports the use of interest rate derivatives in its annual report and zero otherwise, the loan spread charged by the bank over LIBOR, an indicator that takes the value of one if the bank loan is secured by collaterals and zero otherwise, an indicator that takes the value of one if the bank loan contains capital expenditure restrictions and zero otherwise, and an indicator that equals one if the firm violates a covenant in a specific year in Panel A of Table 9. The coefficient for the interaction term, Local male-female ratio * Ln (book assets), is significantly negative in regressions of firm risk level, risk-taking policies and borrowing costs (i.e., option-implied volatility, market leverage, capital expenditure, loan spread, collateral requirement, capital expenditure restrictions and covenant violations), and is significantly positive in regression of interest rate hedging. These results confirm that the effect of local male-female ratio is stronger for smaller firms.

In addition, Hong, Kubik, and Stein (2008) show that companies located in areas with fewer other firms around receive higher valuations (i.e., the only game effect). For firms which face little competition from neighboring companies and attract more attention from local investors, the effect of local male–female ratio should be stronger. In Panel B of Table 9, we include the interaction term between the local male–female ratio and the number of firms in the county. The results line up with the predictions for the moderation effect of the number of neighboring firms, which suggest that the effect of local male–female ratio is stronger in counties with a lower density of companies. Specifically, the coefficient of the interaction between local male–female ratio and the number of firms in the county is negative and statistically significant in regressions of option-implied volatility, market leverage, loan spread, collateral requirement, capital expenditure restrictions and covenant violations, while the coefficient of the interaction term is positive and statistically significant in regressions of cash holdings and the likelihood of interest rate hedging.

In addition, because dividend-paying stocks are often considered to be safer and more stable (Baker and Wurgler, 2004; Becker, Ivković, and Weisbenner, 2011), we expect that risk averse female investors are more likely to prefer dividend-paying stocks than male investors. Thus, we test whether a higher local female ratio leads to higher dividend payouts, by running panel regressions of firms' dividend payouts against the local male-female ratio. These results are reported in Appendix Table A8. We find that firms located in counties with a higher male-female ratio set significantly higher dividends, suggesting that firms tailor their dividend policies to cater to the gender imbalance in local demographics.

5.3. Identifying the preference transmission mechanism: The employee channel

Intuitively, we expect that most corporate decisions are influenced by corporate employees, especially members of the management and monitoring team, such as executives and board directors. We examine whether local gender differences affect corporate employment using two tests.

First, we explore whether gender differences in the local population amplify gender imbalances among local employees. Appendix Table A9 shows the results of a panel regression of the male–female ratio among local employees against the local male–female ratio. Consistent with our prediction, the results show that a higher local male–female ratio drives a higher male–female ratio among local employees. Individuals, including top firm managers, prefer to conform to their peers in terms of preferences and practices (Kohlberg, 1984), possibly because employees induce conformity by sharing their preferences or exerting peer pressure. Therefore, a more gender-skewed employee base can strengthen the preference for risk in corporate norms. In addition, local employees might express their risk attitudes through equity-based compensation, for example, male employees might express their risk preferences by choosing more equity-based compensation, which in turn affects corporate activities (Spalt, 2013). Firms also cater to the preferences of their employees, including non-executive

[16] Managers may cater to shareholders' demand. For example, firms may adjust their payout policies (e.g., Baker and Wurgler, 2004; Becker, Ivković, and Weisbenner, 2011), investment policies (Polk and Sapienza, 2009), and stock-split decisions (Baker, Greenwood, and Wurgler, 2009), according to shareholders' needs.

Table 9
Local Male-Female Ratio Interactions with Firm Size and Number of Firms in a County
This table presents estimates of interaction analysis. The independent variable of interest is the interaction term of the local male-female ratio and the firm's book size in Panel A and the interaction term of the local male-female ratio and the number of firms in the county in Panel B. In regression (1) to (9), the dependent variable is firms' option-implied volatility, market leverage ratio, capital expenditure, cash holdings, an indicator that equals one if the firm reports the use of interest rate derivatives in annual report and zero otherwise, the loan spread charged by the bank over LIBOR, an indicator that equals one if the bank loan is secured by collaterals and zero otherwise, an indicator that equals one if the bank loan contains a capital expenditure restriction and zero otherwise and an indicator that equals one if the firm violate a covenant in a specific year, respectively. The *t*-statistics in parentheses are based on standard errors adjusted for heteroskedasticity and allow for clustering within firms. ***, **, and * represent significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Local Male-Female Ratio Interacts with Firm Size

	Option-Implied Volatility (1)	Market Leverage (2)	Capital Expenditure (3)	Cash Holdings (4)	Interest Rate Hedging (Industrial firms) (5)	Loan Spread (6)	Collateral Require-ment (7)	Capital Expenditure Restriction (8)	Covenant Violation (9)
Local male-female ratio	0.057***	0.181***	0.068**	-0.096	-3.497***	2.714***	5.706***	6.013***	2.153***
	(8.68)	(6.89)	(2.05)	(-1.50)	(-6.59)	(5.30)	(6.05)	(3.96)	(5.59)
Local male-female ratio * Ln	-0.005***	-0.020***	-0.003**	0.002	0.133**	-0.261***	-0.474***	-0.519***	-0.127**
(book assets)	(-5.77)	(-7.51)	(-2.49)	(0.24)	(1.99)	(-3.67)	(-3.20)	(-2.73)	(-2.33)
Ln (book assets)	0.001	0.027***	0.002**	-0.014	0.193	0.086	0.192	0.284*	-0.025
	(0.80)	(10.01)	(2.08)	(-1.61)	(2.89)	(1.27)	(1.34)	(1.69)	(-0.52)
County characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
All relevant controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	17,936	83,059	83,059	83,059	45,830	10,844	10,844	2,772	45,830
Adjusted /Pseudo R^2	0.648	0.612	0.366	0.349	0.295	0.825	0.355	0.330	0.116

Panel B: Local Male-Female Ratio Interacts with the Number of Firms in a County

	Option-Implied Volatility (1)	Market Leverage (2)	Capital Expenditure (3)	Cash Holdings (4)	Interest Rate Hedging (Industrial firms) (5)	Loan Spread (6)	Collateral Require-ment (7)	Capital Expenditure Restriction (8)	Covenant Violation (9)
Local male-female ratio	0.021***	0.110***	0.056	-0.118***	-2.405***	0.278	1.910***	3.899***	1.659***
	(6.35)	(4.35)	(1.49)	(-3.37)	(-12.03)	(1.00)	(4.56)	(3.12)	(4.65)
Local male-female ratio *	-0.026***	-0.046**	-0.013	0.036**	0.237*	-0.100*	-0.119*	-2.589*	-0.532**
Number of firms in the county	(-4.86)	(-2.23)	(-0.59)	(2.37)	(1.65)	(-1.76)	(-1.68)	(-1.83)	(-2.37)
Number of firms in the county	0.029***	0.041**	0.012	-0.028	-0.136***	0.165**	0.086	2.551*	0.475**
	(5.54)	(2.11)	(0.65)	(-2.11)	(-6.35)	(2.30)	(0.74)	(1.90)	(2.17)
County characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
All relevant controls	-	-	-	-	-	Yes	Yes	Yes	-
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	17,936	83,059	83,059	83,059	45,830	10,844	10,844	2,772	45,830
Adjusted /Pseudo R^2	0.652	0.611	0.366	0.348	0.295	0.568	0.381	0.348	0.115

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Table 10
Inspecting the Mechanism: Impact of the Local Male–Female Ratio on Female Representation among Corporate Directors/CEOs
This table reports the impacts of the local male–female ratio on female representation among corporate directors and executives. Regressions (1)–(4) report the results of panel regressions of the corporate female board fraction, defined as the number of female directors divided by the total number of directors, against the local male–female ratio. In regressions (5)–(8), the dependent variable is the proportion of female CEOs plus female directors, which is calculated as the sum of an indicator of female CEO and the total number of female directors divided by (1+ the total number of directors). All regressions include other local population characteristics and firm characteristics as additional controls. Column (4) and (8) include the 2-digit SIC industry fixed effects. The *t*-statistics in parentheses are based on standard errors adjusted for heteroskedasticity and allow for clustering within firms. ***, **, and * represent significance at the 1%, 5%, and 10% levels, respectively.

	Proportion of Female Directors				Proportion of Female CEOs and Directors			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Local male-female ratio	-0.076**	-0.113***	-0.135**	-0.139**	-0.075**	-0.114***	-0.133**	-0.124*
	(-2.21)	(-2.75)	(-2.32)	(-2.01)	(-2.06)	(-2.62)	(-2.20)	(-1.68)
Local female-male income ratio		0.191**	0.141	0.197**		0.210**	0.137	0.208**
		(2.28)	(1.36)	(2.22)		(2.42)	(1.26)	(2.25)
Board size			0.001	0.001			0.001	0.001
			(0.80)	(1.06)			(0.71)	(0.89)
Percentage of independent directors			0.014	0.015			0.015	0.015
			(1.07)	(1.15)			(1.11)	(1.04)
County characteristics								
Local higher education proportion		0.079***	0.109***	0.062		0.082***	0.116***	0.061
		(3.31)	(3.44)	(1.63)		(3.19)	(3.48)	(1.63)
Ln (local population)		0.006***	0.005**	0.004		0.006***	0.004*	0.003
		(3.52)	(2.12)	(1.44)		(3.41)	(1.83)	(1.30)
Ln (local household income)		0.029*	0.029	0.045*		0.028*	0.030	0.045*
		(1.83)	(1.35)	(1.89)		(1.67)	(1.35)	(1.83)
Local unemployment rate		0.043	0.103	0.138		0.025	0.118	0.140
		(0.37)	(0.57)	(0.70)		(0.21)	(0.63)	(0.72)
Local average age		0.010	-0.031	-0.067		0.010	-0.031	-0.065
		(0.20)	(-0.50)	(-1.00)		(0.20)	(-0.49)	(-0.91)
Firm characteristics								
Tangibility		0.006	-0.001	-0.002		0.003	-0.003	-0.008
		(0.80)	(-0.05)	(-0.15)		(0.33)	(-0.28)	(-0.47)
Ln (book assets)		-0.005***	-0.004**	-0.006***		-0.005***	-0.004**	-0.006***
		(-4.61)	(-2.30)	(-2.73)		(-4.49)	(-2.42)	(-2.69)
Market leverage		0.007	0.014	0.012		0.006	0.009	0.011
		(0.82)	(1.15)	(1.08)		(0.69)	(0.75)	(0.98)
Free cash flow		0.012*	0.029***	0.027**		0.005	0.023**	0.029**
		(1.72)	(2.59)	(2.39)		(0.66)	(2.43)	(2.50)
Market-to-book		0.001	0.001	0.001		0.000	0.000	0.001
		(1.23)	(0.58)	(1.08)		(0.67)	(0.10)	(0.89)
Profit		0.003	0.008	0.009		0.012	0.004	0.006
		(0.21)	(0.27)	(0.34)		(0.78)	(0.16)	(0.22)
Sales growth		-0.003	-0.007*	-0.002***		-0.002	-0.008	-0.002***
		(-1.08)	(-1.66)	(-2.92)		(-1.18)	(-1.65)	(-3.84)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	No	No	No	Yes	No	No	No	Yes
Observations	27,142	25,101	9,608	9,608	27,142	25,101	9,608	9,608
Adjusted R^2	0.036	0.050	0.035	0.147	0.039	0.051	0.034	0.156

employees (Spalt, 2013). Appendix Table A10 shows that a higher male–female ratio is significantly correlated with higher non-executive employee stock options and greater employee involvement (via employee stock ownership plans (ESOPs) or employee stock purchase plans (ESPPs)). These results suggest that the risk attitudes of local employees influence corporate decisions.

Second, we examine whether local gender imbalances influence gender imbalances among key decision makers, such as corporate executives and board directors. Studies often find that firms with larger proportions of male executives or directors tend to have higher risk profiles.[17] For example, Faccio, Marchica, and Mura (2016) find that firms with male CEOs have higher leverage and more volatile earnings. Pan, Siegel, and Wang (2017) show that the risk attitudes of firms' leaders affect corporate policies. Although corporate executives and directors may not be local residents, their behavior interacts with local traits. Ewens and Townsend (2020) show that female investors express more interest in female entrepreneurs than in observably similar male entrepreneurs, and vice versa. To the extent that female investors tend to select female entrepreneurs, the investor channel can amplify the effect of the employee channel and increase the expression of risk aversion among female leadership. Therefore, we hypothesize that a firm based in an area with a lower male–female ratio has more female executives and board directors, leading to a decrease in risk-taking by the firm.

[17] In contrast, Ahern and Dittmar (2012) find that the boards of a sample of Norwegian firms become riskier after imposing female board representation quotas.

Table 11
Local Overconfidence and CEO Overconfidence
This table reports the results of panel regressions of CEO overconfidence against local overconfidence. We classify a CEO as overconfident if they postpone the exercise of vested stock options that are at least 67% in the money, following Malmendier and Tate (2005, 2008). The dependent variable equals one if the CEO is overconfident, and zero otherwise. Local overconfidence is calculated as the average of the overconfidence scores for the following four items related to confidence in the 2016 General Social Survey (GSS): "In uncertain times I usually expect the best," "I'm always optimistic about my future," "If something can go wrong for me it will," and "I rarely count on good things happening to me." These items are scored on a 5-point scale from 1 to 5. We convert and aggregate the responses to these four items and take the county-level average. A higher score indicates greater overconfidence. All regressions include other local population characteristics and firm characteristics as additional controls. The *t*-statistics in parentheses are based on standard errors adjusted for heteroskedasticity and allow for clustering within firms. ***, **, and * represent significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)
Local overconfidence	0.327**	0.392**	0.413**	0.516**
	(2.49)	(2.26)	(2.34)	(2.17)
County characteristics				
Local higher education proportion			-0.239	-0.927
			(-0.27)	(-0.56)
Ln (local population)			-0.285***	-0.249
			(-2.64)	(-1.51)
Ln (local household income)			-0.514	5.681
			(-0.70)	(1.28)
Local unemployment rate			6.238	5.271
			(0.65)	(0.28)
Local average age			0.301	6.465
			(0.22)	(0.56)
Tangibility		-0.119	-0.060	0.034
		(-0.23)	(-0.11)	(0.06)
Ln (book size)		0.051	0.036	0.052
		(1.14)	(0.77)	(1.05)
Market leverage		-0.876**	-1.073**	-1.120**
		(-2.03)	(-2.44)	(-2.39)
Free cash flow		21.356**	20.878**	22.451**
		(2.34)	(2.23)	(2.22)
Market-to-book		0.382***	0.374***	0.396***
		(4.27)	(4.17)	(4.30)
Profitability		1.159**	0.986*	0.881
		(2.02)	(1.67)	(1.50)
Sales growth		0.136	0.172	0.146
		(0.57)	(0.68)	(0.58)
Year fixed effects	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes
State fixed effects	Yes	Yes	Yes	Yes
Observations	527	527	527	527
Pseudo R^2	0.071	0.163	0.179	0.202

In Table 10, we provide direct evidence showing that a higher local male–female ratio is associated with a lower proportion of female CEOs and directors. In regressions (1)–(4), we regress the proportion of female corporate board members on the local male–female ratio after controlling for other county and firm characteristics. Following Huang and Kisgen (2013), we apply board characteristics (board size and the percentage of independent directors) in regression (3) and the industry fixed effects in regression (4). Regressions (1)–(4) provide consistent evidence that a higher local male–female ratio leads to lower proportions of female corporate board members. In regressions (5)–(8), we use the proportion of female CEOs and female directors.[18] Again, a higher local male–female ratio decreases the proportion of female CEOs and directors of a company, revealing a plausible mechanism by which local residents' risk attitudes are transmitted into corporate decisions.

To further examine the impacts of local gender imbalances on corporate executives, we test whether CEO overconfidence is related to overall local overconfidence. Overconfident CEOs often engage in riskier corporate activities than their less confident peers (e.g., Malmendier and Tate, 2005; Malmendier and Tate, 2008; Gervais, Heaton, and Odean, 2011; Hirshleifer, Low, and Teoh, 2012). Following Malmendier and Tate (2005, 2008), we define a CEO as overconfident when they postpone exercising vested stock options that are at least 67% in the money.[19] Table 11 reports the results of panel regressions of CEO overconfidence against local overconfidence. Notably, a higher level of local overconfidence is associated with a higher de-

[18] As female CEOs are relatively rare in our sample, we do not consider female CEOs separately.

gree of CEO overconfidence. This suggests that a higher local male–female ratio is associated with a higher level of CEO overconfidence, leading to increased corporate risk-taking activities.

However, these results should be interpreted with caution. An alternative but related interpretation is that female executives may select to work in a city with a more balanced gender ratio or higher female ratio. That is, they tend to locate in cities with local culture that is friendly to female executives. In this case, even though female executives' choice of working locations is still consistent with our hypothesis that firms based in areas with a higher female-male ratio has more female executives and board directors, this alternative interpretation makes it difficult to assess the causal impact of local gender imbalance through the channel of female executives and directors.

6. Conclusion

This paper explores the effects of local gender imbalance on corporate activities from the risk preference perspective, as men appear to be less risk averse and more overconfident than women. We find that the male–female ratio among local residents is positively related to risk-taking at local firms. Specifically, firms based in counties with a higher local male-female ratio have higher option-implied return volatilities, leverage ratios and capital expenditure, and lower cash holdings and lower likelihood of engaging in hedging activities. We also find that firms in areas with a higher local male–female ratio face higher loan spreads and stricter loan conditions and incur more covenant violations.

Moreover, we show that our findings are more pronounced when local investors are more likely to have large influences, e.g., among smaller firms and in counties with fewer firms, which provides support for the investor channel by which local risk attitudes are transmitted into corporate decision-making. We also find that a higher local male–female ratio leads to a lower proportion of local female employees, less female representation among CEOs and board directors, higher levels of CEO overconfidence, and higher levels of employee stock options and involvement. These findings suggest that the risk attitudes of the local population are also conveyed to corporate decision makers via an employee channel that may complement the local investor channel. Overall, these results suggest that local gender imbalance is an important driver of corporate risk-taking.

Declaration of Competing Interest

None

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.jebo.2022.05.001.

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[19] Following Hirshleifer, Low, and Teoh (2012), we define a CEO as overconfident from the first point at which they exhibit such behavior. We do not require a CEO to hold a 67% in the money option at least twice, as this requirement would introduce look-ahead bias. We collect CEO option holdings in 2017 from the S&P Execucomp database. Other measures of CEO overconfidence might also be helpful, e.g., CEO portrayals in the business press (Malmendier and Tate, 2008) or using survey data (Ben-David, Graham, and Harvey, 2013).

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