WORKING PAPER

FEMALE MANAGERS AND FIRM PERFORMANCE IN EUROPE

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Abstract

This paper builds a large pan-European panel dataset of firm-level senior management gender composition. We focus the dataset on firms in the business economy that file unconsolidated accounts and report both total assets and strict positive employment throughout their existence. We have management information for 9 million firms for the period 2005-2020 resulting in 60 million firm-year observations. Overall 40% of observations concerns firms with at least one female manager and 60% are led only by male managers. For (predominantly micro) firms with a single manager that account for 53.5% of observations, we find that only 23% are female-managed. 59.5% of firms with two or more managers have at least one female manager. Across countries between 14% and 66% of observations refer to firms where at least half of the managers are female, across industries variation is more limited and ranges between 20% and 53%. We find that within tight country-industry-year cells women-led SMEs are smaller and less productive and show lower leverage. Real performance differences are sustained in an event study analysis of switching firms, financial performance differences are not. Female-managed firms show lower short and medium-run growth rates. These effects are small and remain unchanged (also in magnitude) when controlling for leverage.

Female-managed firms do not differ in terms of exporting behaviour and responses to import shocks. We find indications that female-managed firms show lower future growth in very uncertain environments, but higher growth in environments characterized by low uncertainty.

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1 Introduction

Board female representation gender diversity is frequently debated by media and policymakers. Several countries have also taken policy initiatives by implementing quota or developing recommendations for diversity (see e.g. Mateos de Cabo et al., 2019). The implementation of quota in Norway on female board representation has been used by e.g. Ahern and Dittmar (2012), Bertrand et al. (2019) and Matsa and Miller (2013) to study its impact on affected firms' and workers' outcomes. Such studies typically focus on a limited set of (publicly traded) firms either because quota only apply to such firms or because of data availability (see e.g. Green and Homroy, 2018).

In this paper we build a large firm-level dataset with senior management information to obtain a broad view on senior management male-female composition across Europe. We create our dataset from raw data retrieved from yearly vintages of Amadeus/Orbis Europe. Christiansen et al. (2016) and Tyrowicz et al. (2020) are closely related papers in terms of the data underlying raw database used to construct our dataset. Christiansen et al. (2016) use only a single vintage of the raw underlying database to analyze the relationship between firm profit indicators and the composition of senior gender management. Tyrowicz et al. (2020) use four vintages of Amadeus and use institutional and resource dependency theoretical frameworks to analyze drivers of differences in gender diversity of both supervisory and management boards across countries and industries. We use our dataset to first document variation in senior management gender composition across countries, industries and firm types for the period 2005-2020. We then proceed with firm-level empirical exercises to analyze differences in real and financial performance between men and women-led enterprises.

Our dataset contains information for 9,011,339 European firms over the period 2005-2020 based on 16 annual vintages of the underlying raw database. We focus on firms active in business economy that file unconsolidated accounts, report total assets and employ at least one employee. In total, we have 59,835,043 firm-year observations. 60% of observations refer to firms led only by male managers, 40% of observations thus concern firms with at least one female manager. 36.7% of observations refer to firms where at least half of the managers are female. Across countries this number varies between 14% and 66% of observations, across industries variation is more limited and ranges between 20% and 53%. 77% of single managed firm observations are male-managed. 40.5% of firms

with two or more managers are fully male-managed, 31% are fully female-managed.[1]

Croson and Gneezy (2009) review the literature on gender differences in economic experiments. They identify robust differences in risk aversion and competitive preferences. These preferences may translate into differences in firm performance between men and women-led firms. However, Croson and Gneezy (2009) do indicate that gender differences are less pronounced and often not found when experiments involve managers. Provided they work, initiatives to stimulate female entrepreneurship and leadership may (gradually) reduce gender-related selection effects and widen differences in e.g. risk preferences between the average male and female manager.

Performance differences may also arise from more difficult access to finance for female entrepreneurs. Several authors have analyzed whether there is a bias against female managers at financial institutions. Ongena and Popov (2016) find that in high-gender-bias countries, female entrepreneurs are more likely to opt out of the loan application process and to resort to informal finance, even though banks do not appear to actively discriminate against them. This finding is confirmed by Moro et al. (2017) who neither find evidence that financial institutions are biased against female managers. Female-run firms are less likely to file a loan application, as they anticipate being rejected. Beck et al. (2018) do find some evidence for the existence of a gender bias, but they also find that learning effects among loan officers lead to the disappearance of the bias. Brock and De Haas (2023) find unconditional loan approval rates to be the same for male and female applicants, but loan officers appear 30% more likely to make loan approval conditional on a guarantor for female entrepreneurs.

We compare firms led by men or women within very tight country-4-digit-industry-year cells. To do so we run regression with these tight fixed effects and firm age and foreign ownership as additional control variables. We consider firms with at least 50% of female managers as women-led firms and create a dummy variable accordingly. On the basis of these regressions we find that women-led firms on average have 13.7% lower total assets, 11.3% less capital, and employ 6.8% less workers. Revenues of women-led firms are 19.5% smaller, revenue efficiency and TFP are 8.9 and 6.5% lower and wages are 4.7% lower. Estimations without tight country-4-digit-industry-year fixed effects show much larger differences, suggesting some selection across industries and countries. These effects

[1]The nature of our data implies that our numbers and analyses refer to the situation $after$ selecting into entrepreneurship or corporate leadership. E.g. Sauer and Wilson (2016) study how gender differences in liquidity constraints affect entrepreneurial outcomes.

are present across different categories of both firm size and the number of senior managers. In terms of financial outcomes we find that women-led SMEs show a lower leverage, a higher current ratio pointing to a better position to meet short-term obligations, and a higher return on assets. The difference in terms of solvency is negative but small, the profit margin is largely unaffected. Financial outcomes seem more dependent on firm size and senior management size as differences vary in size, significance, and sometimes even direction.

We also present three exploratory exercises to shed further light on the role of risk aversion and access to finance in decision-making. We analyze the decisions regarding exporting and firm responses to trade and uncertainty shocks. Overall we find limited indications for different behavior of women-led firms in terms of exporting and responses to import shocks when controlling for firm size, age, leverage, and productivity. Given the included controls the gender variable probably points rather to limited differences in risk aversion. We find some indications that women-led firms show lower future growth in very uncertain environments, but higher growth in environments characterized by low uncertainty.

The remainder of this paper is organized as follows. In section 2 we discuss the construction of our dataset and provide a first brief overview in terms of its firm-level composition and data availability for specific financial and real variables and the availability of data over time. Section documents how senior management male/female composition varies across countries and industries. Section 4 analyzes differences in real, financial, and growth outcomes between men and women-led firms in tight country-4-digit-industry-year cells. Section 5 presents three exploratory exercises with respect to exporting and the impact of trade and uncertainty shocks. Finally, section 6 concludes.

2 Data

In this section, we first describe how we constructed our dataset and then provide a brief overview of the data.

2.1 Data construction

We create our dataset from raw data retrieved from annual versions of Amadeus/Orbis Europe provided by Bureau van Dijk - A Moody's Company. Specifically, raw data comes from annual versions of Amadeus (1999-2015) and under its alternative name Orbis

Europe (2016-2020). Table **??** in Appendix lists the specific versions we use. To create our dataset we proceeded as follows. First, we downloaded all information under the 'management' heading from Amadeus/Orbis Europe. Management info is reported only from the 2005 version onward, so versions 1999-2004 were not used. For each of these firms, we retrieve the following information: firm identifier, manager first and last name, management title, management gender, position and committee membership. As we have annual versions of the database, we only retain 'current' manager information from later Orbis versions where 'previous' managers' information is also available. Second, for reasons of cross-country comparability[2], we retain all information on managers that are part of '*senior management*' as this provides us with consistent information across countries and firm sizes. In the remainder of the paper, if we refer to a manager we understand this to be a member of senior management. As there is no time indicator associated with management information we attribute information to the year of the version. In a third step, all information from the annual versions is appended together to construct a firm-manager-year panel. At this stage we apply firm ID changes that occurred between the 1999 and 2020 versions which we retrieve from Bureau van Dijk's dedicated website. For those versions of the database where management gender is not directly available as a variable, we infer a manager's gender from the manager salutation variable ("Mr." versus "Mrs."). Further, we match managers' first and last names within firms and assign gender information from versions where it is available to versions where it is not available. In a limited number of cases we observe a manager name in $t-1$ and $t+1$ but not in t. In this case, we assume this manager also was also a manager at time t. For each firm-year, we then retain the number of senior managers and the number of female managers in senior management.[3]

This information is then matched with financial data from the same underlying raw database that is processed as described in Kalemli-Ozcan et al. (2022) and Merlevede et al. (2015) (but updated to the last version of the database). This restricts our main dataset to firms that file financial accounts, specifically we only retain firms that file unconsolidated accounts and report total assets. We further restrict the dataset to firms that are active in the business economy, i.e. NACE Revision 2 2-digit codes 5 to 82. Finally, we exclude firms that report zero employees at some point in time from our dataset and focus on

[2]Information on 'Board of Directors' varies widely across countries which relates both to the legal framework and requirements in terms of the organisation of firms.

[3]Table D.1 in Appendix shows that this results in more than 200 million firm-year observations in 2005-2020.

Table 1: Summary statistics (firm-year observations)

	No.	Mean	Stdev.	p25	Median	p75
# managers	59,835,043	1.7	1.5	1.0	1.0	2.0
# female managers	59,835,043	0.6	1.0	0.0	0.0	1.0
share female managers	59,835,043	33.1	43.7	0.0	0.0	100.0
real total assets (log)	59,835,043	12.3	2.3	10.9	12.4	13.8
employees	38,467,324	13.7	32.5	1.0	3.0	10.0
employees (log)	38,467,324	1.5	1.3	0.0	1.1	2.3
real capital (log)	46,047,507	10.5	2.6	8.7	10.5	12.3
real intangibles (log)	52,502,462	2.4	4.2	-0.0	0.0	5.2
real revenue efficiency (log)	24,952,123	11.3	1.4	10.5	11.3	12.1
WLP-TFP (log)	14,931,708	10.1	1.2	9.4	10.2	10.9
return on assets	31,718,593	-0.0	38.1	-1.5	2.0	9.7
leverage (%)	41,209,581	72.0	97.6	27.7	57.4	84.7

Firms in the business economy filing unconsolidated accounts and reporting total assets. Firms that report zero employees are excluded from the sample. Financial variables winsorized at the 1st and 99th percentile to calculate summary statistics.

employer firms. We also exclude firms where we never observe information on the number of employees.[4]

2.2 Brief data overview

Our final dataset has management information for 9,011,339 firms over the period 2005-2020 which results in 59,835,043 firm-year observations. Table 1 shows summary statistics for the main variables we use for our analysis. One can see that available information on specific financial items from the annual accounts affects the number of available observations that can be used for analysis. Tables A.1 to A.4 in Appendix A provide insight into the distribution of the data over time, countries, and industries and how available information on financial items affects the number of observations across these dimensions.

Table 1 shows that firms on average have 1.7 members of senior management and 0.6 female members of senior management, 37.06% of all managers are female managers. The top part of table 2 shows that 53.5% of observations concerns firms with only a single manager and that a female manager leads23% of single-manager firms. Firms with two managers account for 32.3% of the observations, firms with three or more managers for 14.2%. With an increasing number of managers the share of firms without a female

[4]This implies that for some firms we do not necessarily observe the number of employees for all years for which we observe management and other financial information.

Table 2: # members of senior management and share of female managers frequency

	firms		share of female managers				
	share	**#**	**0**	**1-25**	**26-50**	**51-99**	**100**
# managers							
1	53.5	32,000,741	77.0				23.0
2	32.3	19,314,344	42.9		22.2		35.0
3	8.6	5,136,947	38.9		19.4	16.3	25.5
4	3.1	1,876,529	32.2	18.4	14.1	12.3	22.9
5-10	2.3	1,401,897	27.8	22.3	19.9	19.5	10.6
>10	0.2	104,585	10.8	43.9	33.1	11.6	0.6
Total	100.0	59,835,043					
firm size							
micro	75.1	28,907,786	62.8	0.7	9.5	1.6	25.4
small	19.2	7,378,659	63.7	2.2	10.4	3.4	20.3
medium	4.7	1,826,829	60.0	5.9	14.0	5.1	15.0
large	0.9	354,050	58.3	12.4	16.4	4.4	8.5
Total	100.0	38,467,324					

			firm size			
			micro	**small**	**medium**	**large**
# managers						
1	56.5	21,717,383	80.6	15.9	3.0	0.5
2	29.1	11,202,313	75.2	19.8	4.3	0.7
3	8.4	3,229,971	60.8	28.6	8.9	1.6
4	3.2	1,222,441	50.9	33.0	13.3	2.9
5-10	2.6	1,008,508	37.0	34.4	21.9	6.7
>10	0.2	86,708	23.2	27.9	26.3	22.6
Total	100.0	38,467,324				

Sample is all firms that employ at least one employee at some point in time that report unconsolidated accounts. Zero employee firms are excluded. Micro firms employ less than 10 employees, small firms between 10 and 50 employees, medium-sized firms between 50 and 250 employees, and large firms more than 50 employees.

Table 3: Women in senior management - annual summary

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	obs.	share fem. man.		at least ... fem. man.			
		mean	stdev	1	50%	100%	none
2005	826,748	0.436	0.465	0.502	0.492	0.373	0.498
2006	1,538,305	0.362	0.454	0.417	0.409	0.309	0.583
2007	1,766,577	0.356	0.450	0.413	0.405	0.301	0.587
2008	2,037,776	0.349	0.447	0.410	0.401	0.292	0.590
2009	2,255,049	0.351	0.446	0.415	0.405	0.291	0.585
2010	3,319,178	0.305	0.429	0.367	0.356	0.248	0.633
2011	3,895,420	0.303	0.427	0.369	0.356	0.244	0.631
2012	3,933,298	0.314	0.430	0.384	0.369	0.251	0.616
2013	4,046,777	0.323	0.432	0.395	0.381	0.258	0.605
2014	4,426,292	0.328	0.432	0.403	0.389	0.257	0.597
2015	4,507,491	0.333	0.434	0.409	0.394	0.262	0.591
2016	4,968,021	0.334	0.437	0.405	0.392	0.268	0.595
2017	5,316,566	0.335	0.437	0.406	0.393	0.268	0.594
2018	5,380,721	0.336	0.438	0.406	0.394	0.270	0.594
2019	5,768,654	0.330	0.437	0.397	0.386	0.268	0.603
2020	5,848,170	0.328	0.436	0.394	0.383	0.265	0.606

All employer firms

manager decreases, but fully women-led firms are considerably more rare than fully men-led firms. Majority women-led firms are also less frequent then majority men-led firms. The fact that most firms in our data have a single senior manager is not surprising as micro firms with less than ten employees are a large part of our sample.[5] They account for 75% of firms for which we observe the number of employees and 80.6% of single manager firms. The share of micro firms decreases with larger senior management size, but still is about 50% of observations with 4 members in senior management. Not unexpectedly, large firms with more than 250 employees make up a large share of firms with large senior management. Across firm size classes, the share of fully men-led firms decreases from 62.8% for micro firms to 58.3% for large firms and outweighs the share of fully women-led firms that decreases more with firm size categories. The gender composition of management is fairly stable. Only 1.68% of 49,856,579 annual (469,729) observations on management *changes*[6] are changes where the 50% female manager threshold is crossed (0.94 are changes to female; 0.74 are changes to male). The gender composition is thus fairly stable in our data.

Table 3 presents summary statistics on women in senior management over the years in our dataset. The average share of female managers decreases between 2005 and 2010 (column 2), but the number of observations also increases considerably in those years (column 1). Starting 2010, the average share of female managers is more stable and very slightly increases from about 30% to 33%. About 60% of firms in the period 2010-2020 are fully men-led (last column). A bit more than a quarter is fully women-led (column 6), there is a slight increase. Table C.7 in Appendix focuses on firms with at least two managers and shows that by the end of the period about 38% of these firms are fully men-led and about 31% are majority women-led (column 6).

3 Senior management gender in Europe

In this section, we show how management gender composition differs across countries and industries. We show figures for 2016-19 and tables for the entire period 2005-2020. Appendices B and C show additional graphs and tables documenting management gender composition in different slices of the data.

Figures 1 and 2 show the share of female managers in total members of senior manage-

[5]The median firm employs three employees, at the 75th percentile a firm employs 10 employees.

[6]This is measured as the first difference of the share of female managers in total senior management on an annual basis.

ment in the period 2016-19. These numbers thus abstract from the firm dimension and lump all managers together by country or industry for the period 2016-19. Figure 1 shows considerable variation across countries. It ranges from about 20% in The Netherlands and Lithuania to 55% in Finland and Ireland. Figure 2 shows that there is also quite some discrepancy across industries. Here, industries are defined as NACE revision 2 sections. The discrepancy is more limited than across countries, ranging from 22% in Electricity and 25% in Finance and Insurance[7] to 43% in Real Estate and 42% in Accomodation and Food or Administrative support.

Tables 4 and 5 present information on the average share over firms in countries and industries for the entire period. This analysis is different from the figures in that the tables explicitly consider the firm dimension and take the share of female managers at the firm -year level as the unit of analysis. The first column of Table 4 provides information on the number of observations per country. Aside from Latvia and Estonia, we observe a substantial number of firms running at least in the 100-thousands for smaller countries. The average share in column 2 confirms the observations from Figure 1 with The Netherlands and Lithuania reporting the lowest average shares and Finland, Ireland, and Great Britain reporting the highest average shares. Overall the average share over all firm observations is 33.1%. 40% of observations concerns firms with at least one female manager, in Ireland this amounts to 73.3%, in The Netherlands to 14.4%. Overall, for 38.7% of observations, at least half of the managers are female. The last lines of Table 4 show that over all countries 23% of firms with only one manager is female managed. 57.1% of firms with two managers has at least one female manager, for firms with at least three managers this is 64.8%. 35% of firms with at least three managers is fully male-managed, 22% is fully female-managed. Table 5 is similar to Table 4 but now presents information on industries. The highest average shares are found in Accomodation-food (section I, 38%), Administrative support (N, 39.5%), and Real estate (L, 39.1%). Three-quarters of firms in Electricity (E), in Finance and Insurance (K) are fully men-led firms.

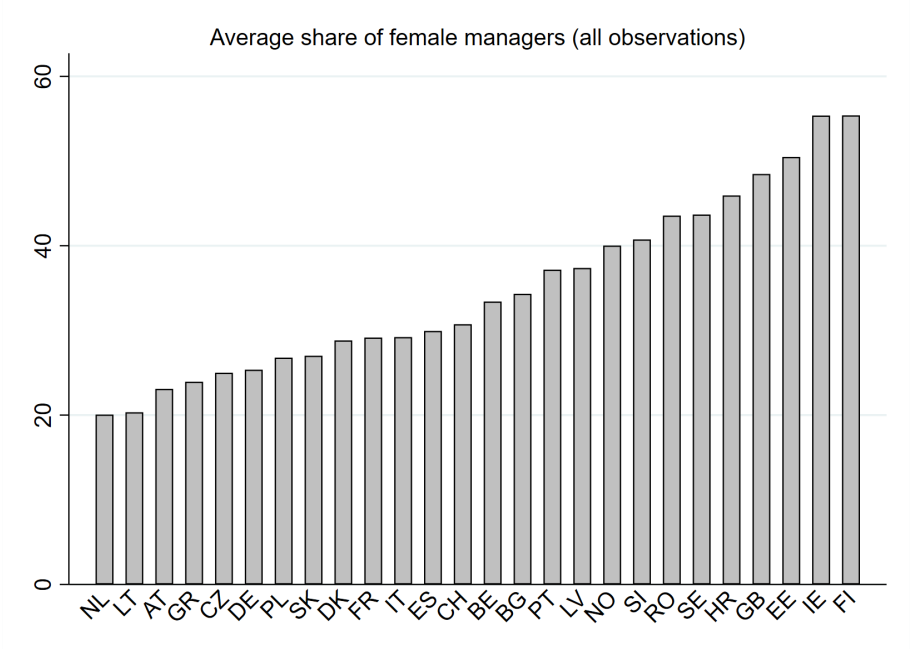
[7]Our data exclude companies that file banking accounts.

Table 4: Women in senior management - cross-country summary

	(1) obs.	(2) share fem. man.	(3)	(4)	(5) at least ... fem. man.	(6)	(7)
		mean	stdev	1	50%	100%	none
AT	1,570,818	0.215	0.394	0.245	0.242	0.188	0.755
BE	2,884,954	0.304	0.399	0.425	0.407	0.199	0.575
BG	2,022,177	0.326	0.448	0.365	0.363	0.288	0.635
CZ	1,149,473	0.222	0.365	0.307	0.301	0.144	0.693
DE	7,396,565	0.228	0.399	0.265	0.260	0.195	0.735
DK	1,126,459	0.225	0.407	0.242	0.241	0.206	0.758
EE	8,327	0.441	0.481	0.474	0.469	0.409	0.526
ES	4,614,969	0.256	0.399	0.324	0.312	0.192	0.676
FI	981,216	0.520	0.482	0.557	0.552	0.479	0.443
FR	1,768,160	0.261	0.424	0.291	0.284	0.233	0.709
GB	15,995,151	0.494	0.456	0.588	0.568	0.405	0.412
GR	223,468	0.228	0.319	0.413	0.359	0.081	0.587
HR	510,087	0.387	0.477	0.408	0.407	0.367	0.592
IE	1,025,704	0.600	0.426	0.733	0.703	0.479	0.267
IT	4,681,731	0.277	0.413	0.353	0.329	0.216	0.647
LT	220,912	0.145	0.343	0.159	0.157	0.133	0.841
LV	87,803	0.396	0.482	0.410	0.409	0.383	0.590
NL	4,520,996	0.139	0.342	0.144	0.144	0.134	0.856
NO	825,387	0.304	0.454	0.315	0.315	0.291	0.685
PL	1,264,105	0.243	0.415	0.271	0.268	0.218	0.729
PT	2,945,828	0.310	0.366	0.483	0.464	0.146	0.517
RO	1,839,151	0.362	0.458	0.407	0.402	0.319	0.593
SE	700,189	0.365	0.471	0.384	0.383	0.344	0.616
SI	336,520	0.360	0.452	0.415	0.412	0.307	0.585
SK	1,134,893	0.258	0.389	0.342	0.338	0.178	0.658
			Firms with ... managers				
one	32,000,741	0.230	0.421	0.230	0.230	0.230	0.770
two	19,314,344	0.460	0.439	0.571	0.571	0.350	0.429
3 or more	8,519,958	0.417	0.392	0.648	0.561	0.222	0.352
Total	59,835,043	0.331	0.437	0.400	0.387	0.267	0.600

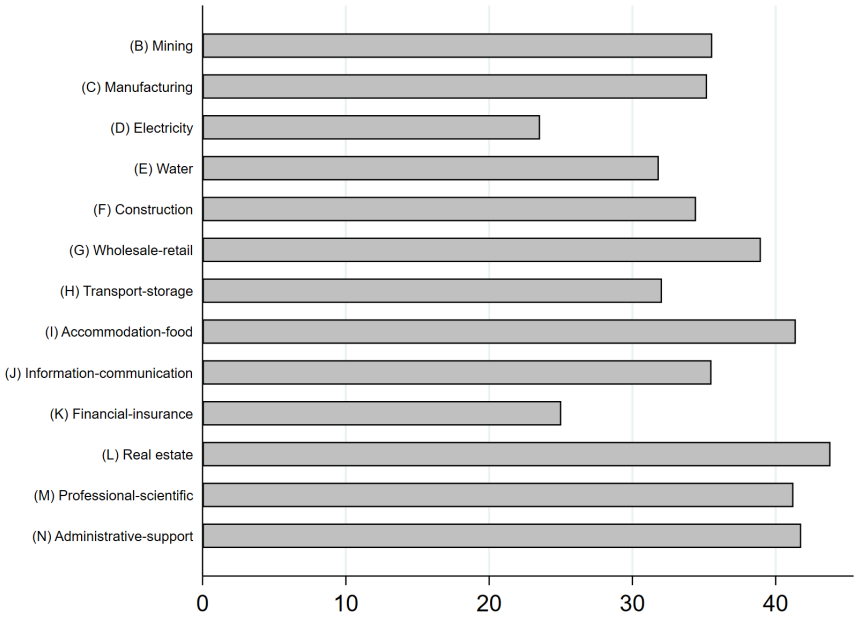
All employer firms

Figure 1: Share of female managers in senior management 2016-19 across countries.



Notes: Sample is

Figure 2: Share of female managers in senior management in 2016-19 across industries.



Notes: Sample is

Table 5: Women in senior management - cross-industry summary

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	obs.	share fem. man.		at least ... fem. man.			
		mean	stdev	1	50%	100%	none
B	153,460	0.317	0.428	0.399	0.373	0.249	0.601
C	7,042,224	0.307	0.422	0.388	0.369	0.234	0.612
D	277,877	0.190	0.353	0.268	0.235	0.134	0.732
E	317,065	0.281	0.411	0.362	0.336	0.214	0.638
F	7,975,213	0.294	0.427	0.349	0.341	0.240	0.651
G	13,219,410	0.344	0.441	0.412	0.403	0.278	0.588
H	2,496,989	0.289	0.419	0.356	0.343	0.228	0.644
I	3,034,184	0.380	0.444	0.463	0.453	0.299	0.537
J	3,858,437	0.331	0.433	0.408	0.393	0.263	0.592
K	3,900,182	0.209	0.388	0.246	0.234	0.179	0.754
L	4,031,153	0.391	0.449	0.472	0.457	0.313	0.528
M	9,260,635	0.360	0.449	0.426	0.415	0.301	0.574
N	4,268,214	0.395	0.452	0.472	0.456	0.323	0.528

All employer firms

4 Senior management gender and financial performance

In this section, we perform several regressions to analyze the association between a firm's management gender composition on the one hand and its real and financial performance on the other. We use a dummy variable to discriminate between female- and men-led firms. Our baseline is that a women-led firm is a firm where at least 50% of managers are female. This is in line with section 3 where we find little difference between different thresholds and a large share of fully men-led firms. Given the limited variation within firms in terms of gender composition we first compare male and women-led firms within tight country-4-digit-industry-year combinations to investigate the association between real and financial firm performance and management gender composition. Specifically, we run the type of regressions as in (1):

$$outcome_{ijct} = \beta_1 female_{ijct} + \beta_2 controls_{ijct} + \delta_{jct} + \epsilon_{ijct} \quad (1)$$

We regress an outcome for firm i in industry j in country c at time t on $female$, a dummy set to one when at least 50% of managers are female. The set of controls includes the log of firm age and a dummy for foreign ownership (set to one if shares are more than 10% foreign-owned) δ_{jct} is a set of country×4-digit-industry×year fixed effects. In the sample there is a maximum of 185,812 country×4-digit-industry×year combinations, the exact number used in the estimations depends on data availability for the specific variables used and estimation sample considered (e.g. separate estimates for large firms).

We consider the following 'real' performance indicators. TA (used in column headings in regression tables) is real total assets which is measured as the log of total assets deflated by country-2-digit-industry output deflators. Deflators are taken from Eurostat (see Merlevede et al. (2015)). L is the log of employees. K is real capital measured as the log of tangible fixed assets deflated by country-2-digit-industry-specific capital deflators (see Merlevede et al. (2015)). Y is the log of real operating revenue (deflated using the output deflator). 'RevEff' is the log of real operating revenue per worker. TFP is log total factor productivity estimated using the Wooldrdige-Levinsohn-Petrin technique (see Wooldridge (2009) and Merlevede et al. (2015)). Finally, W is real wage, calculated as deflated costs of employees divided by the number of employees. All real performance variables are trimmed at the first and 99th percentile within firm size classes: i) micro

firms with less than ten employees; ii) small firms with between 10 and 50 employees; iii) medium-sized firms with between 50 and 250 employees; and iv) large firms with more than 250 employees. This avoids trimming away all large firms.

We consider the following 'financial' performance indicators. Leverage is, following Kalemli-Özcan et al. (2022), defined as the ratio of total liabilities to total assets. Total liabilities is the sum of long-term debt, loans, trade credit, and other current liabilities. We also split leverage in a financial part (long-term debt and loans) and a non-financial part (trade credit and other current liabilities). The current ratio is measured as the ratio of current assets to current liabilities. The current ratio measures a company's ability to meet its short-term obligations with its current assets and reflects the firm's liquidity position. Solvency represents a company's ability to meet all of its financial obligations and is measured as the sum of depreciation and net income divided by the sum of long-term debt and short-term loans. RoA, return on assets, is measured as the ratio of net income to total assets. Finally, the gross profit margin is measured as profit (loss) before tax divided by sales. All variables are trimmed within firm size classes such that their kurtosis falls below ten (see Kalemli-Özcan et al. (2022)).[8]

Tables 6, 7, and 8 present results for real and financial performance. Tables 6 and 7 consist of different panels with different samples being used for the results in the different panels. Panel A and B use all firms, panels C to F present results by firm size class. Panel A shows results of estimating (1) without control variables and without fixed effects, from panel B onwards estimations include controls and fixed effects. Table 8 contains separate results for different sizes of the senior management team, both for real and financial variables.

Real performance Panel A of Table 6 shows that unconditionally women-led firms are substantially smaller in terms of operating revenue (44%), total assets (43%), and capital (38%), and between 14 and 23% for the other indicators. These differences are considerably smaller when we introduce the control variables and the country×4-digit-industry×year fixed effects in panel B. This suggests some selection of female managers in certain industries (or countries). Women-led firms have 20% smaller operating revenue, 14% less total assets, 11% less capital, and employ 7% less workers. Revenue efficiency and TFP of women-led firms are 8.9 and 6.5% lower, wages are 4.7% lower. While smaller

[8]The 10th and 90th percentile for solvency and the current ratio, the 7.5th and 92.5th percentile for the other financial variables.

Table 6: Real performance

	(1) TA	(2) L	(3) K	(4) Y	(5) RevEff	(6) TFP	(7) W
	A - All firms, no fixed effects						
Female	-0.426***	-0.136***	-0.385***	-0.437***	-0.232***	-0.152***	-0.153***
	[0.002]	[0.001]	[0.002]	[0.002]	[0.001]	[0.001]	[0.001]
obs.	58,639,803	38,442,531	45,126,568	29,813,686	24,453,133	14,633,079	22,186,219
R-sq.	0.009	0.002	0.006	0.009	0.007	0.004	0.004
	B - All firms, fixed effects, controls						
Female	-0.137***	-0.068***	-0.113***	-0.195***	-0.089***	-0.065***	-0.047***
	[0.001]	[0.001]	[0.002]	[0.002]	[0.001]	[0.001]	[0.001]
obs.	58,511,845	38,328,407	45,049,544	29,707,665	24,351,878	14,586,482	22,114,422
R-sq.	0.346	0.363	0.310	0.415	0.477	0.506	0.650
	C - Micro firms, fixed effects, controls						
Female	-0.072***	0.007***	-0.000	-0.108***	-0.088***	-0.051***	-0.036***
	[0.001]	[0.001]	[0.002]	[0.001]	[0.001]	[0.001]	[0.001]
obs.	28,222,538	28,799,103	21,684,495	17,304,776	17,303,953	9,995,723	15,969,442
R-sq.	0.422	0.224	0.270	0.434	0.457	0.468	0.616
	D - Small firms, fixed effects, controls						
Female	-0.063***	-0.007***	0.034***	-0.055***	-0.050***	-0.036***	-0.026***
	[0.002]	[0.001]	[0.003]	[0.002]	[0.002]	[0.002]	[0.001]
obs.	7,202,386	7,348,556	6,892,536	5,270,235	5,270,254	3,465,593	4,395,982
R-sq.	0.420	0.085	0.289	0.485	0.550	0.600	0.803
	E - Medium-sized firms, fixed effects, controls						
Female	-0.129***	-0.031***	-0.019***	-0.112***	-0.076***	-0.049***	-0.045***
	[0.004]	[0.002]	[0.006]	[0.004]	[0.003]	[0.003]	[0.002]
obs.	1,759,050	1,776,541	1,702,550	1,392,976	1,392,977	882,102	1,389,060
R-sq.	0.497	0.110	0.422	0.540	0.616	0.680	0.807
	F - Large firms, fixed effects, controls						
Female	-0.267***	-0.095***	-0.199***	-0.212***	-0.111***	-0.078***	-0.068***
	[0.014]	[0.007]	[0.018]	[0.012]	[0.008]	[0.008]	[0.005]
obs.	316,661	317,002	302,182	295,339	295,481	176,350	279,925
R-sq.	0.585	0.220	0.570	0.550	0.700	0.764	0.794

Standard errors clustered at firm level in brackets; *** p<0.01, ** p<0.05, * p<0.1.

Table 7: Financial performance

	(1) leverage	(2) leverage	(3)	(4) current	(5) solvency	(6) RoA	(7) profit
		financial	non-fin.	ratio			margin
	A - All firms, no fixed effects						
Female	-0.021***	-0.013***	-0.007***	-0.017***	-0.019***	0.051***	0.000
	[0.000]	[0.000]	[0.000]	[0.001]	[0.001]	[0.007]	[0.000]
obs.	35,028,166	33,349,372	30,663,688	42,709,717	10,409,860	26,960,809	20,596,847
R-sq.	0.001	0.001	0.000	0.000	0.000	0.000	0.000
	B - All firms, fixed effects, controls						
Female	-0.011***	-0.004***	-0.004***	0.041***	-0.002***	0.019***	-0.000***
	[0.000]	[0.000]	[0.000]	[0.001]	[0.001]	[0.006]	[0.000]
obs.	34,947,669	33,227,469	30,578,703	42,636,461	10,378,651	26,859,695	20,515,767
R-sq.	0.099	0.153	0.149	0.069	0.086	0.069	0.057
	C - Micro firms, fixed effects, controls						
Female	-0.009***	-0.002***	-0.006***	0.032***	-0.001	-0.043***	-0.001***
	[0.000]	[0.000]	[0.000]	[0.002]	[0.001]	[0.009]	[0.000]
obs.	17,896,274	17,129,882	15,768,439	20,927,181	5,452,435	15,187,252	12,691,798
R-sq.	0.115	0.154	0.150	0.082	0.085	0.080	0.081
	D - Small firms, fixed effects, controls						
Female	-0.011***	-0.002***	-0.008***	0.035***	0.018***	0.057***	0.000***
	[0.000]	[0.000]	[0.000]	[0.002]	[0.002]	[0.011]	[0.000]
obs.	5,382,283	5,084,704	4,674,179	5,236,756	2,146,616	4,031,494	3,492,048
R-sq.	0.116	0.147	0.170	0.102	0.110	0.136	0.105
	E - Medium-sized firms, fixed effects, controls						
Female	-0.007***	0.003***	-0.007***	0.028***	0.008*	0.115***	0.001***
	[0.001]	[0.001]	[0.001]	[0.003]	[0.005]	[0.020]	[0.000]
obs.	1,355,216	1,350,734	1,241,101	1,332,991	747,479	1,263,622	911,240
R-sq.	0.170	0.203	0.240	0.148	0.152	0.166	0.167
	F - Large firms, fixed effects, controls						
Female	-0.007***	0.006***	-0.008***	0.034***	-0.017	0.275***	0.001**
	[0.002]	[0.002]	[0.002]	[0.007]	[0.023]	[0.052]	[0.000]
obs.	246,429	259,083	236,782	243,607	144,821	249,211	184,199
R-sq.	0.282	0.308	0.352	0.244	0.237	0.236	0.271

Standard errors clustered at firm level in brackets; *** p<0.01, ** p<0.05, * p<0.1.

Table 8: Performance differences for different senior management team sizes

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
				I - REAL PERFORMANCE			
	TA	L	K	Y	RevEff	TFP	W
	I.A - Single manager, fixed effects, controls						
Female	-0.157***	-0.063***	-0.120***	-0.184***	-0.097***	-0.077***	-0.047***
	[0.002]	[0.001]	[0.002]	[0.002]	[0.001]	[0.001]	[0.001]
obs.	31,248,237	21,400,590	23,325,595	17,546,691	14,318,253	8,566,641	12,554,804
R-sq.	0.390	0.352	0.299	0.411	0.487	0.486	0.666
	I.B - Two managers, fixed effects, controls						
Female	-0.224***	-0.146***	-0.188***	-0.285***	-0.106***	-0.103***	-0.069***
	[0.002]	[0.001]	[0.003]	[0.003]	[0.002]	[0.002]	[0.001]
obs.	18,890,585	11,054,469	14,891,047	7,758,160	6,310,357	3,797,164	5,906,095
R-sq.	0.349	0.378	0.338	0.417	0.458	0.515	0.626
	I.C - Three or more managers, fixed effects, controls						
Female	-0.427***	-0.246***	-0.270***	-0.392***	-0.125***	-0.102***	-0.078***
	[0.004]	[0.003]	[0.004]	[0.004]	[0.002]	[0.002]	[0.001]
obs.	8,322,379	5,464,089	6,783,378	4,350,231	3,670,089	2,181,268	3,604,537
R-sq.	0.321	0.368	0.312	0.431	0.437	0.521	0.575

				II - FINANCIAL PERFORMANCE			
	leverage	leverage		current	solvency	RoA	profit
		financial	non-fin.	ratio			margin
	II.A - Single manager, fixed effects, controls						
Female	-0.005***	-0.005***	-0.001***	0.027***	0.006***	-0.084***	-0.001***
	[0.000]	[0.000]	[0.000]	[0.002]	[0.001]	[0.009]	[0.000]
obs.	19,130,173	17,712,319	16,305,063	22,327,340	5,461,782	15,627,055	12,605,845
R-sq.	0.106	0.165	0.155	0.084	0.088	0.076	0.074
	II.B - Two managers, fixed effects, controls						
Female	-0.005***	-0.005***	-0.001***	0.027***	0.006***	-0.084***	-0.001***
	[0.000]	[0.000]	[0.000]	[0.002]	[0.001]	[0.009]	[0.000]
obs.	19,130,173	17,712,319	16,305,063	22,327,340	5,461,782	15,627,055	12,605,845
R-sq.	0.106	0.165	0.155	0.084	0.088	0.076	0.074
	II.C - Three or more managers, fixed effects, controls						
Female	-0.025***	-0.014***	-0.006***	0.067***	0.014***	0.044***	0.001***
	[0.001]	[0.000]	[0.000]	[0.002]	[0.002]	[0.012]	[0.000]
obs.	5,198,865	5,312,073	4,883,194	6,316,960	1,990,221	4,152,288	2,708,521
R-sq.	0.114	0.131	0.168	0.074	0.098	0.098	0.091

Standard errors clustered at firm level in brackets; *** p<0.01, ** p<0.05, * p<0.1.

than without controls and fixed effects, these effects are still substantial. Panels C to F show that these effects are particularly pronounced among medium-sized and especially large firms. Table 8 shows that these effects hold across different sizes of the management team, but that the size-related effects (TA, L, K, Y) are especially pronounced in firms with three or more managers. Note that these are not necessarily small firms (*cf. supra* and notice the number of observations). Differences with respect to efficiency and wages are also significant, but much less pronounced.

Financial performance Table 7 focuses on financial performance. Performance differences are much more mitigated than for real outcomes. Introducing fixed effects and controls still substantially reduces performance differences. Column 1 of panel B shows that female-led firms have a leverage that is on average 1.1%-points lower than for male-managed firms in the same country-industry-year with limited differences between the financial and non-financial part of the leverage.[9] Female-led firms have a current ratio that is 4.1%-points higher pointing to a better position to meet short-term obligations, the difference in terms of solvency is slightly negative but small at -0.2%-points, return on assets is 1.9%-points higher on average for female-managed firms. Panels C to F and II.A to II.C of Table 8 vary considerably both with firm size and the size of the senior management team. For leverage variation is limited, except for firms with three or more senior managers. In this case leverage is 2.5% lower. The same observation holds for the current ratio. Concerning solvency and return on assets the average negative and positive differences hide substantial heterogeneity among groups. Return on assets is higher in female-managed firms for larger firms and firms with three or more managers, but negative for micro firms and firms with one or two managers.

Overall in terms of real performance, male-managed firms seem to outsize and outperform female-managed firms. This finding is consistent across firm sizes and sizes of the senior management team. With respect to financial performance, we find considerable heterogeneity in relative differences between male and female-managed firms. Especially firms with three or more managers that are female managed seem to outperform male-managed firms with respect to the current ratio, solvency, return on assets, and the profit margin, while being less leveraged.

[9]Schopohl et al. (2021) find that female Chief Financial Officers in UK firms significantly reduce the firm's leverage but that this is moderated by the senior decision-making environment in the firm.

Table 9: Real growth

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	1 year growth				5 year growth			
	lnL	lnK	RevEff.	TFP	lnL	lnK	RevEff.	TFP
	A - Baseline							
Female	-0.0021***	-0.0044***	-0.0015***	-0.0015***	-0.0142***	-0.0237***	-0.0046***	-0.0054***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.001]	[0.001]	[0.001]	[0.001]
obs.	28,403,371	19,722,924	18,550,698	11,086,449	11,154,472	8,556,446	7,978,180	4,754,428
R-sq.	0.026	0.018	0.034	0.122	0.065	0.041	0.078	0.248
	B - Leverage as additional control							
Female	-0.0034***	-0.0044***	-0.0005**	-0.0009***	-0.0143***	-0.0205***	-0.0032***	-0.0057***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.001]	[0.002]	[0.001]	[0.001]
Leverage	-0.0087***	-0.0635***	0.0387***	0.0541***	-0.0242***	-0.1823***	0.0184***	0.0773***
	[0.000]	[0.001]	[0.001]	[0.001]	[0.001]	[0.003]	[0.002]	[0.002]
obs.	19,261,517	14,496,121	13,906,628	8,785,448	8,465,475	6,644,359	6,177,913	3,879,942
R-sq.	0.030	0.019	0.036	0.097	0.072	0.044	0.076	0.174
Controls	Y	Y	Y	Y	Y	Y	Y	Y
C-I-Y FE	Y	Y	Y	Y	Y	Y	Y	Y

TABLE NOTE lnK is net investment Standard errors clustered at firm level in brackets; *** p<0.01, ** p<0.05, * p<0.1.

Growth Next we also look at short and medium run growth differences for employment, capital, revenue efficiency and total factor productivity. Short run growth rates are created using one year differences in the log of the variables, medium run growth rates consider five year differences in the log of the variables. We estimate equation (6) for our sample of SMEs.

$$\Delta^{t,t+x} outcome_{ijct} = \beta_1 female_{ijct} + \beta_2 controls_{ijct} + \beta_3 leverage_{ijct} + \delta_{jct} + \epsilon_{ijct} \qquad (2)$$

Here $\Delta^{t,t+x} outcome_{ijct}$ is the one or five (denoted by x) year forward growth rate of one of the outcome variables for firm i in industry j in country c at time t. The variable $female$ and the control variables are defined as before. We now include $leverage_{ijct}$ as an additional control variable to see how financial conditions affect future growth. The change in the capital stock can be considered as investment. In line with Kalemli-Özcan et al. (2022) we define investment as the change in the net fixed capital stock, defined as tangible fixed assets minus depreciation, and consider the log change in real net fixed capital stock as dependent variable.

The first four columns of Table 9 consider one-year changes, columns 5 to 8 five-year (medium run) changes. Given the different access to external funds we estimate (6) both

with and without leverage to get an idea on how much this drives potential differences between male and female-managed firms. The first panel of Table 9 shows that differences are significant both on a one and five year horizon. Female-maged firms grow slower, but the effects are relatively small with investment at 0.4% being the largest difference. These effects translate into larger differences on a five year horizon with employment growth 1.4% lower and investment 2.4% lower. Revenue efficiency and TFP grow at a 0.5% lower rate on a five year horizon. These effects continue to hold when controlling for leverage and point estimates barely change. This could be an indication that risk aversion is more likely at play than more difficult access to finance for women-led firms.

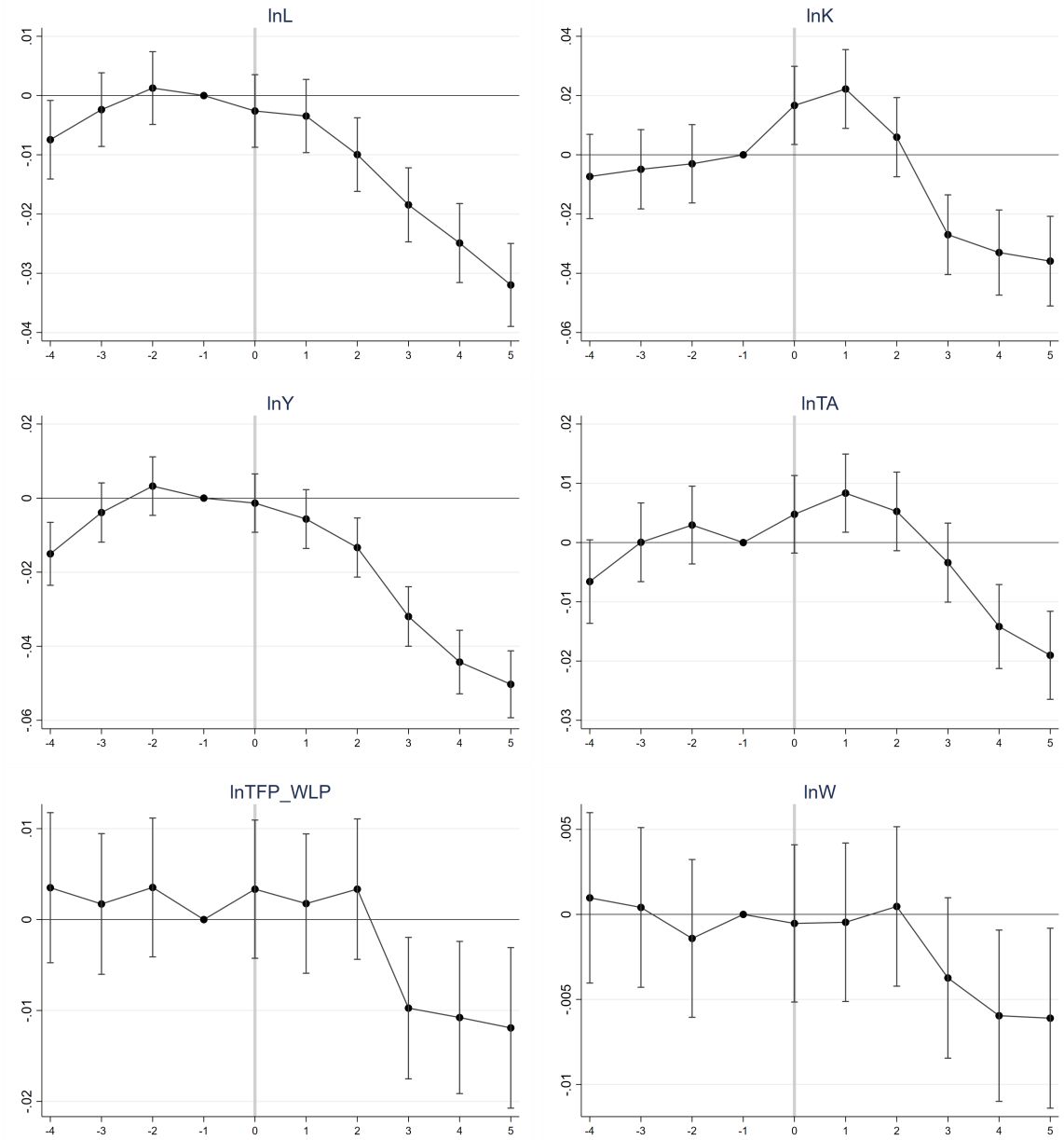
Event study Finally, we complement these correlation with a simple event study diff-in-diff comparing firms with a single switch from male to female managed firms. We observe 33,281 firms that switch one time from male to female management and matched these with always male managed firms. We match firms within country-industry-year triplets in the year before the switch occurs. We find close matches based on firms' levels of total assets, capital stock, sales (in real terms), employment and management team size using multivariate-distance matching (Mahalanobis) and retain the nearest neighbour. We only use firms that at least report these variables from three years before to three years after the switch. We use specification (3) to estimate the effect of switching to a female management in existing firm i in industry j in country c at time t:

$$Y_{ijct} = \alpha_i + \sum_{\tau=t_{start}-5}^{t_{end}+5} \beta_{1\tau} \times Switch_i \times \mathbb{1}(t=\tau) + \delta_{jct} + \varepsilon_{ijct} \quad (3)$$

We normalize outcomes relative to the year before the switch occurs such that coefficients $\beta_{x\tau}$ can be interpreted as differences relative to the level of outcome Y one year before the switch which is captured by the fixed effect α_i. The indicator function $\mathbb{1}(.)$ denotes year-specific effects from four years before the start of the episode to five years after the end of the episode. The time index $t = 0$ corresponds to the end year of the switch. The year $t = -1$ is the year before the start of the episode with respect to which outcomes are normalized. The coefficient estimated for $t = 0$ will then reflect the immediate effect in the year of the switch.

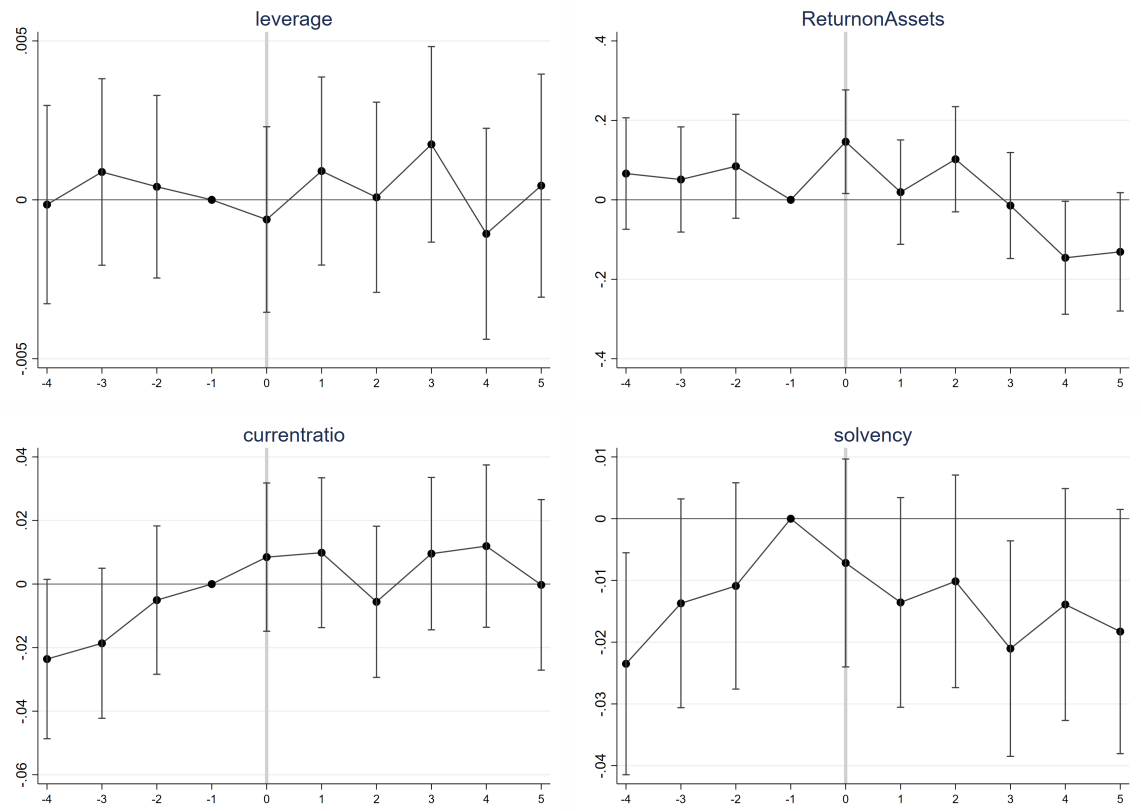
Figures 3 and 4 show the results of this exercise. Figure 3 shows that the average underperformance of female-managed firms with respect to real outcomes is confirmed

Figure 3: Event study diff-in-diff comparing firms increasing the share of female managers above 50% to matched firms always run by male management teams: real outcomes.



Note: Panel headings indicate (log) variables: employment L, capital K, output Y, total assets TA, productivity TFP_WLP, wages W. The horizontal axis marks the time relative to the switch to more than 50% female managers. Coefficients are normalized relative to the year before the switch. The time-varying effects are indicated by dots connected by a full line, 95% confidence intervals are given by vertical lines with caps. The estimation samples consists of 33,281 firms that switch and their matched male-managed firms.

Figure 4: Event study diff-in-diff comparing firms increasing the share of female managers above 50% to matched firms always run by male management teams: financial outcomes.



Note: Panel headings indicate variables considered. The horizontal axis marks the time relative to the switch to more than 50% female managers. Coefficients are normalized relative to the year before the switch. The time-varying effects are indicated by dots connected by a full line, 95% confidence intervals are given by vertical lines with caps. The estimation samples consists of 33,281 firms that switch and their matched male-managed firms. For TFP and wages we have observation for 27th and 31th firms.

but only from two or three years after the switch. Total assets and the capital stock even briefly increase relative to male-managed firms before starting to lose track of male-managed firms. Figure 4 shows that financial performance is mostly unaffected by the switch.

5 Senior management gender and decision making

In this section we explore potential avenues to use the data beyond comparisons of outcomes and take a first look at potential differences between male and female led firms in their decision making and responses to shocks. Specifically, we focus on the decision to export and exporting and firms' responses to trade and uncertainty shocks. Depending on the exercise, the data is reduced to more limited sets of firms in specific countries and industries.

We see these three exploratory exercises as providing some insight in the role of risk aversion and access to finance. Croson and Gneezy (2009) review the literature on experiments on gender differences in risk preferences and find robust differences in risk preferences and competitive preferences. This holds for the population in general, but experiments among managers are less conclusive and do not always find systematic differences between male and female managers due to selection effects. Many European countries in our dataset have set up initiatives to advance female entrepreneurship in the last two decades potentially mitigating the role of selection effects.

5.1 Exporting

Melitz (2003) models entry into export markets as firms facing a sunk cost that only the most productive can pay. The model has on the one hand been extended to explicitly allow a role for uncertainty (see e.g. Handley and Limao, 2015), on the other hand access to finance can play a role (see e.g. Bergin et al., 2021). We use our data to set up a simple test to analyze *prima facie* differences between men and women-led SMEs in exporting. We use data for manufacturing firms in France, Croatia, and Greece as we observe export data for almost all firms in these countries. As noted before the stability of management gender makes it difficult to use the within dimension for identification. Therefor we compare firms within tight country×4-digit-industry×year cells. We estimate the following specification:

Table 10: Men and women-led SMEs and exporting

	(1)	(2)	(3)	(4)	(5)	(6)
	exporter		export volume		export share	
	All SME					
female	0.016*	0.016*	0.143	0.148	-0.536	-0.529
	[0.008]	[0.008]	[0.108]	[0.108]	[0.489]	[0.489]
$leverage_{t-1}$		-0.003		0.171		0.210
		[0.009]		[0.119]		[0.659]
size	0.087***	0.087***	1.685***	1.687***	4.299***	4.300***
	[0.004]	[0.004]	[0.053]	[0.053]	[0.276]	[0.275]
age	0.013**	0.013**	0.046	0.060	-2.061***	-2.048***
	[0.006]	[0.006]	[0.077]	[0.078]	[0.344]	[0.349]
TFP	0.045***	0.045***	0.945***	0.954***	3.269***	3.281***
	[0.008]	[0.008]	[0.103]	[0.103]	[0.526]	[0.526]
Observations	57,419	57,408	57,419	57,408	57,419	57,408
R-squared	0.290	0.290	0.377	0.377	0.332	0.332
C-I-Y FE	Y	Y	Y	Y	Y	Y

Countries included: France, Croatia, Greece. Only firms in manufacturing. Standard errors clustered at firm level in brackets; *** p<0.01, ** p<0.05, * p<0.1.

$$exp_{ijct} = \beta_1 female_{ijct} + \beta_2 controls_{ijct-1} + \beta_3 leverage_{ijct} + \delta_{jct} + \epsilon_{ijct} \quad (4)$$

We consider three different dependent variables: i) *exporter*, a dummy set to one when the firm is exporting; ii) *export volume*, the log of real exports; and iii) *export share*, the ratio of exports to turnover (expressed as a percentage). The controls include age, size, TFP, and leverage. We estimate specifications both with and without leverage to investigate whether gender effects operate through access to finance. Table 10 presents results for all SMEs. Overall this initial analysis does not suggest any differences between men and women-led firms. If anything women-led firms are more likely to be an exporter. Including leverage or not does not affect results. Leverage itself neither does seem to play a role. Larger, older, and more productive firms are more likely to export, export larger volumes, and show higher export shares. As we found above that women-led firms are smaller and less productive these elements also factor in.

5.2 Import competition

Bloom et al. (2015) analyze the impact of Chinese import competition on technology

Table 11: Men and women-led SMEs and import competition

	(1) Y	(2) L	(3) RevEff.	(4) TFP	(5) K	(6) W
	three year growth					
shock × fem	-0.021**	-0.005	-0.010*	-0.005	0.010	-0.006
	[0.009]	[0.006]	[0.006]	[0.006]	[0.010]	[0.004]
female	0.034***	0.014***	0.007	0.007	-0.017*	0.006*
	[0.008]	[0.005]	[0.005]	[0.005]	[0.010]	[0.004]
leverage	-0.025	0.000	0.002	0.037***	-0.036***	-0.013***
	[0.016]	[0.000]	[0.004]	[0.008]	[0.012]	[0.001]
Observations	232,560	274,860	221,077	162,138	194,785	196,485
R-squared	0.107	0.086	0.104	0.143	0.073	0.116
	five year growth					
shock × fem	-0.037**	-0.009	-0.015*	-0.005	0.005	-0.004
	[0.015]	[0.010]	[0.009]	[0.009]	[0.017]	[0.006]
female	0.048***	0.018**	0.005	0.002	-0.024	0.006
	[0.014]	[0.008]	[0.008]	[0.007]	[0.016]	[0.005]
leverage	-0.022	-0.003	0.003	0.047***	-0.024	-0.008*
	[0.015]	[0.003]	[0.011]	[0.009]	[0.021]	[0.004]
Observations	159,591	190,697	150,248	109,346	132,841	133,540
R-squared	0.120	0.099	0.121	0.178	0.082	0.147
Controls	Y	Y	Y	Y	Y	Y
C-I-Y FE	Y	Y	Y	Y	Y	Y

Controls size (lagged real TA), log age. Only firms in manufacturing with matched trade data. Capital is net capital. Two-way clustered standard errors at firm and country-industry-year level in brackets; *** p<0.01, ** p<0.05, * p<0.1.

upgrading for a set of European countries. In this section we set up a similar exercise to explore whether men and women-led SMEs respond differently to trade shocks. To construct the trade shock we match Comtrade data to 4-digit-industry codes and consider the log change in total imports in country c in industry j between the average import in 1998-2000 and year t. We again compare men and women-led SMEs within tight country×4-digit-industry×year cells. The sample for this exercise is now determined by the country-industry combinations for which we find the necessary data to construct the import shock and only includes manufacturing industries. We estimate the following specification:

$$\Delta^{t,t+x} outcome_{ijct} = \beta_1 imp_{jct} + \beta_2 imp_{jct} \times fem_{ijct} + \beta_3 fem_{ijct} + \beta_4 ctrls_{ijct} + \delta_{jct} + \epsilon_{ijct} \quad (5)$$

Here $\Delta^{t,t+x} outcome_{ijct}$ is the three or five (denoted by x) year forward growth rate of one of the outcome variables for firm i in industry j in country c at time t. imp is the import shock, fem our dummy as before. Control variables are size, age, and leverage (defined as before). As outcome variables we consider revenue (Y), employment (L), revenue efficiency, TFP, capital (defined to have net investment, $cf.supra$), and wages (W). Standard errors are two-way clustered at firm and country-industry-year level.

Table 11 presents results for all SMEs for both three or five-year forward growth rates. The level effect of the shock is captured by the fixed effects, δ_{jct}. Our focus is on the interaction effect between the shock and the female dummy that captures whether women-led firms respond differently to the shock. Overall the table suggests –controling for leverage– there is little difference between men and women-led SMEs in terms of their response to the trade shock. Only for revenue growth we find a larger negative impact for women-led firms with 1.8% and 3.1% lower growth on a three and five year horizon for the average level of the import shock. The effect on revenue efficiency is also negative and borderline significant, but amounts to less than one percent for the average import shock.

5.3 Uncertainty

As a final exploratory exercise we look at how uncertainty affects firms' future growth path. We use the uncertainty indicator as introduced and constructed by Baker et al. (2016). Whereas Baker et al. (2016) focus on US uncertainty, they also construct a measure of

Table 12: Men and women-led SMEs and uncertainty

	(1) Y	(2) L	(3) RevEff.	(4) TFP	(5) K	(6) W
	three year growth					
shock × fem	-0.023	-0.005	-0.005	-0.011**	-0.027***	-0.005*
	[0.017]	[0.005]	[0.005]	[0.005]	[0.009]	[0.003]
female	0.118	0.029	0.021	0.052*	0.135***	0.024
	[0.085]	[0.024]	[0.027]	[0.027]	[0.047]	[0.015]
leverage	-0.000**	-0.000***	0.000	0.005***	-0.011**	-0.000
	[0.000]	[0.000]	[0.000]	[0.002]	[0.005]	[0.000]
Observations	1,663,990	2,276,897	1,595,927	979,950	1,212,144	1,285,687
R-squared	0.064	0.035	0.044	0.068	0.039	0.052
	five year growth					
shock × fem	-0.038	-0.010	-0.015	-0.020***	-0.016	-0.016**
	[0.025]	[0.007]	[0.011]	[0.007]	[0.014]	[0.007]
female	0.197	0.052	0.071	0.093***	0.086	0.075**
	[0.127]	[0.035]	[0.053]	[0.033]	[0.066]	[0.033]
leverage	-0.000**	-0.000***	-0.000	0.006***	-0.005	-0.000
	[0.000]	[0.000]	[0.000]	[0.002]	[0.008]	[0.000]
Observations	1,072,200	1,512,978	1,023,776	611,764	754,572	825,363
R-squared	0.080	0.042	0.053	0.093	0.044	0.056
Controls	Y	Y	Y	Y	Y	Y
C-I-M-Y FE	Y	Y	Y	Y	Y	Y

Controls size (lagged real TA), log age. Following countries are included DE FR IT GB ES. Capital is net capital. Two-way clustered standard errors at firm and country-month-year level in brackets; *** p<0.01, ** p<0.05, * p<0.1.

European policy-related economic uncertainty, which is documented and made available at a dedicated website[10]. The index is constructed for five large European countries[11] and is based on newspaper articles[12], counting the number of articles containing terms regarding policy uncertainty. We first annualize the monthly series by summing the last twelve months and then take logarithms. We then match this month-year series to our firm-level data. At this stage we use the information on the month of the end-date of firms' accounting year[13] to match uncertainty data with firm-level information at the month-year-country level. We then proceed estimating specifications similar to (5) but additionally use the monthly dimension in the uncertainty indicator:

$$\Delta^{y,y+x} outcome_{ijcmy} = \beta_1 ucty_{cmy} + \beta_2 ucty_{cmy} \times fem_{ijcmy} + \beta_3 fem_{ijcmy} + \beta_4 ctrls_{ijcmy} + \delta_{jcmy} + \epsilon_{ijcmy} \tag{6}$$

Now y indicates year and m month and compare firms within country×4-digit-industry×month-year cells. All outcomes and control variables are as in section 5.2 Standard errors are two-way clustered at firm and country-month-year level.

Table 12 presents results. The level effect of uncertainty is captured by the fixed effects, our focus is on whether men and women-led firms are affected differently by the shock. All interaction effects in Table 12 have a negative sign pointing to a stronger negative effect of uncertainty on women-led firms. However, many effects are insignificant, only TFP, wages, and net investment on a three year horizon are significant. Further when, we find significant negative interaction effects, the female dummy itself is positive and significant. For the mean level of uncertainty (which is 5.08) the combined effect is around zero, suggesting that women-led firms show lower future growth in very uncertain environments, but higher growth in environments characterized by low uncertainty.

6 Conlusion

This paper builds a large pan-European panel dataset of firm-level senior management gender composition using several vintages of the Amadeus-database. We focus the dataset

[10] `https://www.policyuncertainty.com`

[11] France, Germany, Italy, Spain, UK

[12] Le Monde and Le Figaro for France, Handelsblatt and Frankfurter Allgemeine Zeitung for Germany, Corriere Della Sera and La Stampa for Italy, El Mundo and El Pais for Spain, and The Times of London and Financial Times for the United Kingdom.

[13] Most firms' accounting year ends in December, but 30.5% of firms have a different month.

on firms in the business economy that file unconsolidated accounts and report both total assets and strict positive employment throughout their existence. We have management information for over 9 million firms for the period 2005-2020 resulting in about 60 million firm-year observations. 60% of observations refer to firms led only by male managers, 40% of observations concerns firms with at least one female manager. 36.7% of observations refer to firms where at least half of the managers are female. Across countries this number varies between 14% and 66% of observations, across industries variation is more limited and ranges between 20% and 53%. We find that within tight country-industry-year cells women-led SMEs are smaller and less productive and show lower leverage. Female-managed firms show lower short and medium-run growth rates, but the effects are relatively small. These effects are unchanged (also in magnitude) when controlling for leverage. Real performance differences are sustained in an event study analysis of switching firms, financial performance differences are not. Female-managed firms do not differ in terms of exporting behaviour and responses to import shocks. We find indications that female-managed firms show lower future growth in very uncertain environments, but higher growth in environments characterized by low uncertainty.

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A APPENDIX - Data overview

Table A.1: Annual frequency of data depending on the availability of specific firm information

	observations with data on senior magement and ...				
	Management only	Net income	Leverage	Revenue efficiency	TFP (WLP)
2005	826,748	526,936	610,233	319,357	159,480
2006	1,538,305	760,127	1,269,184	711,684	310,141
2007	1,766,577	841,272	1,416,970	782,615	347,670
2008	2,037,776	978,165	1,570,042	877,191	417,004
2009	2,255,049	1,086,746	1,641,115	980,886	482,337
2010	3,319,178	1,729,735	2,477,924	1,505,276	849,826
2011	3,895,420	1,975,838	2,814,737	1,751,884	1,002,849
2012	3,933,298	2,125,904	2,826,073	1,684,647	1,022,638
2013	4,046,777	2,272,146	2,885,149	1,763,188	1,066,402
2014	4,426,292	2,563,524	3,183,518	2,000,006	1,253,780
2015	4,507,491	2,565,304	3,177,716	1,963,670	1,265,880
2016	4,968,021	2,641,733	3,281,829	2,033,031	1,271,163
2017	5,316,566	2,855,359	3,347,945	2,217,643	1,398,008
2018	5,380,721	2,785,555	3,352,062	2,109,479	1,340,777
2019	5,768,654	3,014,582	3,580,156	2,241,827	1,397,772
2020	5,848,170	2,995,667	3,774,928	2,270,295	1,345,981
Total	59,835,043	31,718,593	41,209,581	25,212,679	14,931,708

All employer firms. Total factor productivity requires availability of: operating revenue, tangible fixed assets (capital), employees, and material costs. Data limited to business economy, i.e. excluding agriculture and non-market services.

Table A.2: Cross-country distribution of data depending on the availability of specific firm information

—	# observations with data on senior magement and ...				
	Management only	Net income	Leverage	Revenue efficiency	TFP
AT	1,570,818	97,547	1,545,911	261,912	34,119
BE	2,884,954	2,878,633	2,673,348	874,353	146,281
BG	2,022,177	1,964,273	1,996,904	1,840,473	830,326
CZ	1,149,473	1,086,064	1,004,210	802,748	507,359
DE	7,396,565	800,934	7,291,530	2,744,499	372,486
DK	1,126,459	1,125,601	584,796	80,748	0
EE	8,327	8,271	4,109	4,832	2,201
ES	4,614,969	4,530,737	4,115,844	3,726,480	2,994,482
FI	981,216	972,697	617,376	573,366	413,778
FR	1,768,160	1,641,988	1,756,252	1,076,426	853,051
GB	15,995,151	1,736,816	6,723,268	839,602	0
GR	223,468	223,455	223,419	206,577	0
HR	510,087	510,083	508,391	428,272	358,960
IE	1,025,704	135,298	396,176	82,976	0
IT	4,681,731	4,681,658	4,675,720	3,837,768	3,473,953
LT	220,912	215,904	31,593	205,936	0
LV	87,803	87,473	87,610	86,049	2,712
NL	4,520,996	132,564	1,146,228	46,568	3,521
NO	825,387	824,979	823,854	771,100	554,633
PL	1,264,105	1,209,075	574,500	545,476	364,704
PT	2,945,828	2,867,804	2,217,088	2,545,820	1,634,699
RO	1,839,151	1,839,148	475,159	1,837,185	1,389,842
SE	700,189	699,634	458,214	681,821	224,544
SI	336,520	333,833	208,706	307,473	279,151
SK	1,134,893	1,114,124	1,069,375	804,219	490,906

All employer firms. Total factor productivity requires availability of: operating revenue, tangible fixed assets (capital), employees, and material costs. Data limited to business economy, i.e. excluding agriculture and non-market services.

Table A.3: Distribution across aggregated industries of data depending on the availability of specific firm information

–	# observations with data on senior magement and ...				
	Management only	Net income	Leverage	Revenue efficiency	TFP
B	150,947	88,834	103,851	72,065	47,725
C	7,034,653	4,661,091	5,725,322	4,174,839	2,997,917
D	280,159	154,091	233,525	113,625	66,787
E	322,609	194,347	258,707	170,883	117,401
F	7,961,590	4,387,693	5,840,008	3,440,192	2,160,821
G	13,052,619	8,733,835	10,054,250	7,278,828	4,740,812
H	2,497,783	1,591,758	1,811,960	1,390,092	800,314
I	3,061,982	2,058,397	2,362,986	1,611,242	1,168,966
J	3,872,623	1,513,394	2,023,640	1,141,225	540,726
K	3,994,739	936,411	1,601,911	479,079	17,052
L	4,240,624	2,104,061	3,100,721	1,283,903	508,017
M	9,164,663	3,744,761	5,564,508	2,818,078	1,188,103
N	4,200,052	1,549,920	2,528,192	1,238,628	577,067

All employer firms. Total factor productivity requires availability of: operating revenue, tangible fixed assets (capital), employees, and material costs. Data limited to business economy, i.e. excluding agriculture and non-market services.

Table A.4: Industry (NACE revision 2 2-digit) distribution of data with information available on items indicated in column headings.

	# observations with data on senior magement and ...				
	Management only	Net income	Leverage	Revenue efficiency	TFP
5	2,075	1,393	1,367	960	535
6	15,872	6,683	6,869	3,236	714
7	2,626	1,885	1,718	1,249	706
8	94,428	66,810	78,468	58,551	42,525
9	35,946	12,063	15,429	8,069	3,245
10	721,548	564,667	604,591	475,286	362,352
11	108,001	77,641	90,808	65,640	50,324
12	2,560	1,888	1,996	1,535	917
13	202,891	147,362	165,586	126,780	97,948
14	246,657	200,911	190,769	175,777	132,576
15	106,822	94,143	89,381	86,157	74,629
16	348,122	251,580	282,546	226,323	162,033
17	107,499	78,436	89,638	69,927	52,420
18	382,386	227,620	304,967	198,535	136,883
19	9,045	6,737	7,222	5,777	3,603
20	192,472	137,863	160,370	121,949	88,260
21	44,406	27,328	34,887	23,301	14,279
22	336,950	234,080	282,233	215,272	156,136
23	315,538	233,881	272,377	210,636	156,993
24	109,803	73,884	94,240	67,317	49,061
25	1,293,323	866,504	1,092,315	803,110	580,232
26	250,024	129,380	199,612	125,272	71,406
27	227,794	141,686	186,195	131,345	88,442
28	581,678	367,103	498,838	349,048	244,275
29	111,568	74,537	90,528	66,602	48,923
30	78,222	45,293	57,854	38,791	26,842
31	310,246	217,794	243,696	191,734	141,887
32	441,938	185,650	325,485	167,935	94,742
33	505,160	275,123	359,188	230,790	162,754
35	280,159	154,091	233,525	113,625	66,787
36	38,571	28,656	29,757	22,289	17,942
37	34,222	19,494	28,234	16,646	10,468
38	222,338	135,260	181,785	122,657	82,861
39	27,478	10,937	18,931	9,291	6,130

All employer firms. Total factor productivity requires availability of: operating revenue, tangible fixed assets (capital), employees, and material costs. Data limited to business economy, i.e. excluding agriculture and non-market services.

Table A.5: (continued) Industry (NACE revision 2 2-digit) distribution of data with information available on items indicated in column headings.

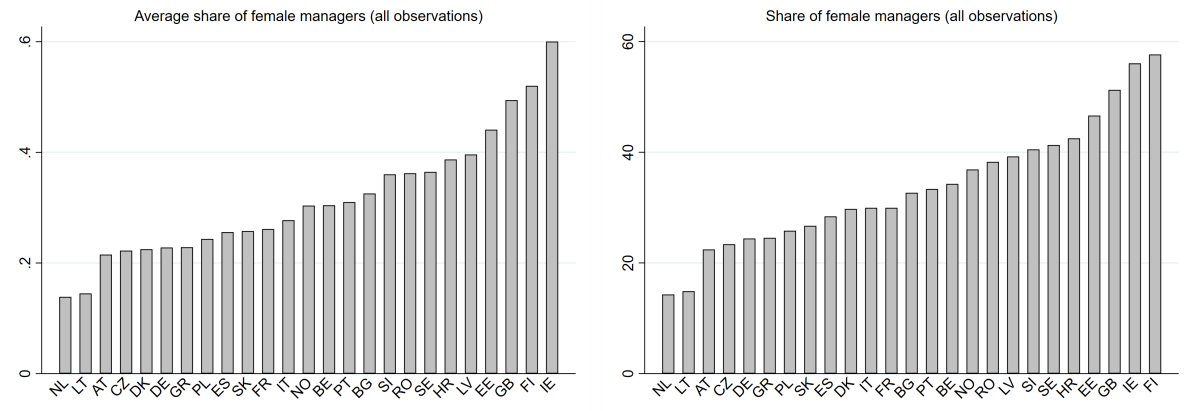
	# observations with data on senior magement and ...				
	Management only	Net income	Leverage	Revenue efficiency	TFP
41	2,954,463	1,856,366	2,122,551	1,301,690	834,976
42	435,388	225,746	299,781	189,520	123,960
43	4,571,739	2,305,581	3,417,676	1,948,982	1,201,885
45	1,965,801	1,214,220	1,526,732	1,045,289	704,696
46	5,606,364	3,860,823	4,377,702	3,166,742	2,089,204
47	5,480,454	3,658,792	4,149,816	3,066,797	1,946,912
49	1,693,651	1,160,377	1,219,293	1,004,971	606,280
50	90,070	36,496	66,183	26,804	12,088
51	31,087	12,125	17,177	8,780	3,677
52	593,199	342,977	452,040	315,649	160,432
53	89,776	39,783	57,267	33,888	17,837
55	767,687	511,926	623,800	414,792	281,245
56	2,294,295	1,546,471	1,739,186	1,196,450	887,721
58	384,203	189,656	228,096	144,761	71,716
59	444,530	159,299	227,215	106,294	49,507
60	53,928	29,223	33,967	23,442	12,913
61	192,312	86,966	108,398	66,926	37,094
62	2,459,895	854,703	1,214,287	653,739	288,774
63	337,755	193,547	211,677	146,063	80,722
64	3,204,972	569,926	1,114,701	209,183	12,076
65	47,672	19,136	25,086	10,741	101
66	742,095	347,349	462,124	259,155	4,875
68	4,240,624	2,104,061	3,100,721	1,283,903	508,017
69	1,479,296	841,343	912,716	627,237	246,526
70	3,755,557	1,006,589	2,161,191	697,774	204,450
71	1,711,558	877,147	1,132,585	719,358	348,185
72	174,618	85,196	113,607	65,800	31,950
73	693,271	388,624	474,383	301,808	152,905
74	1,256,993	486,624	708,008	359,340	169,366
75	93,370	59,238	62,018	46,761	34,721
77	424,907	227,684	330,008	176,382	95,760
78	390,783	120,526	200,594	104,815	25,151
79	322,794	190,556	230,055	163,764	76,565
80	177,034	85,768	110,184	70,188	41,230
81	665,565	345,304	485,650	287,417	175,989
82	2,218,969	580,082	1,171,701	436,062	162,372

All employer firms. Total factor productivity requires availability of: operating revenue, tangible fixed assets (capital), employees, and material costs. Data limited to business economy, i.e. excluding agriculture and non-market services.

B APPENDIX - Additional figures with distributions

Figure B.1: Share of female managers in senior management for countries.

All firms



Firms with at least 3 managers

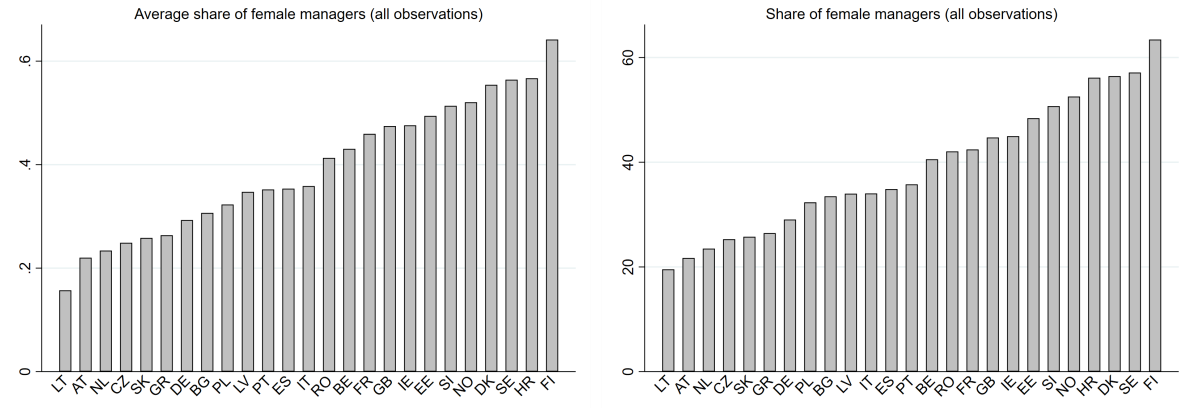
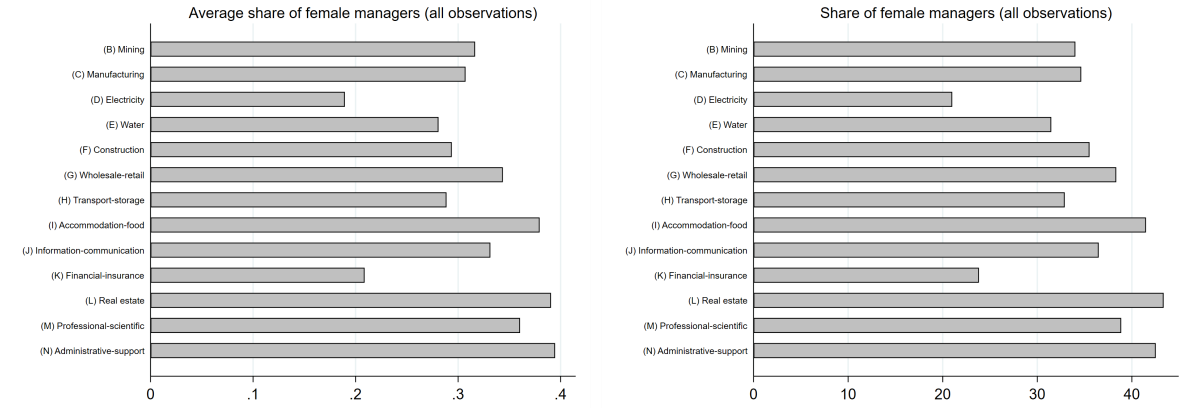


Figure B.2: Share of female managers in senior management for industries.

All firms



Firms with at least 3 managers

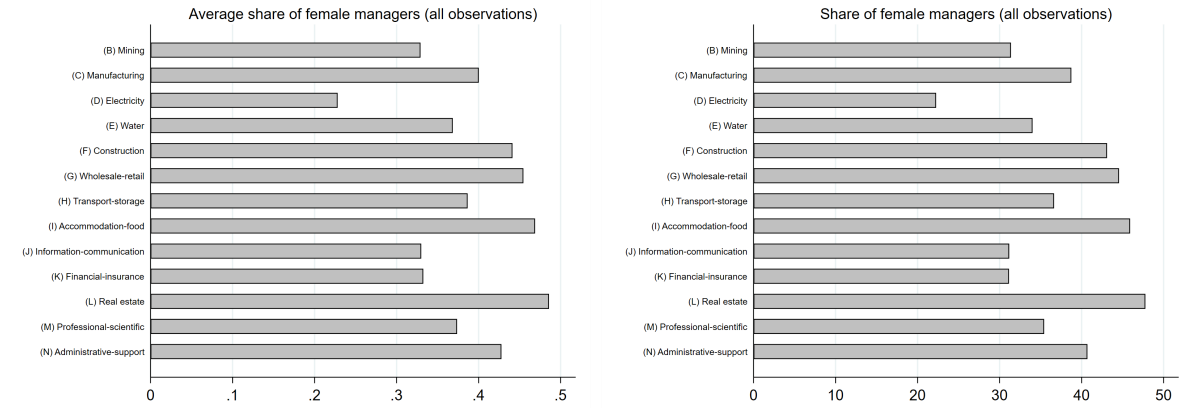
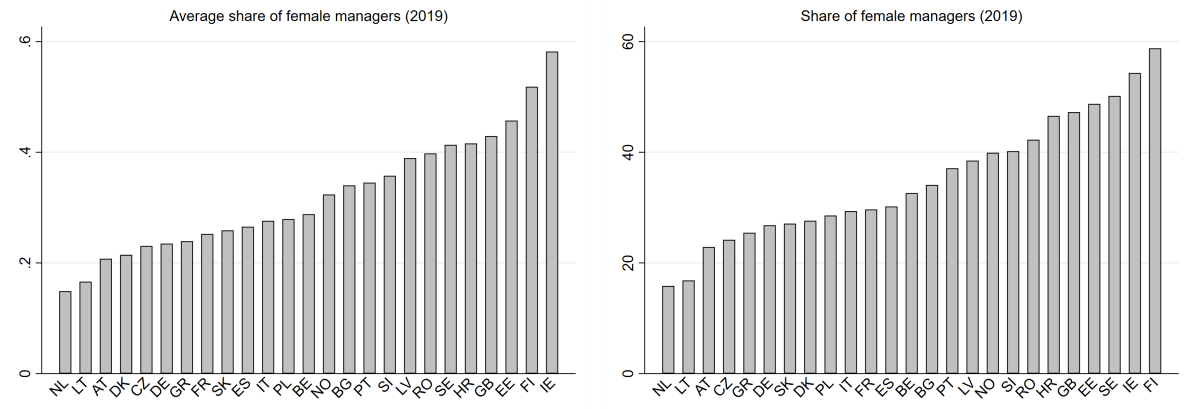


Figure B.3: Share of female managers in senior management for countries in 2019.

All firms



Firms with at least 3 managers

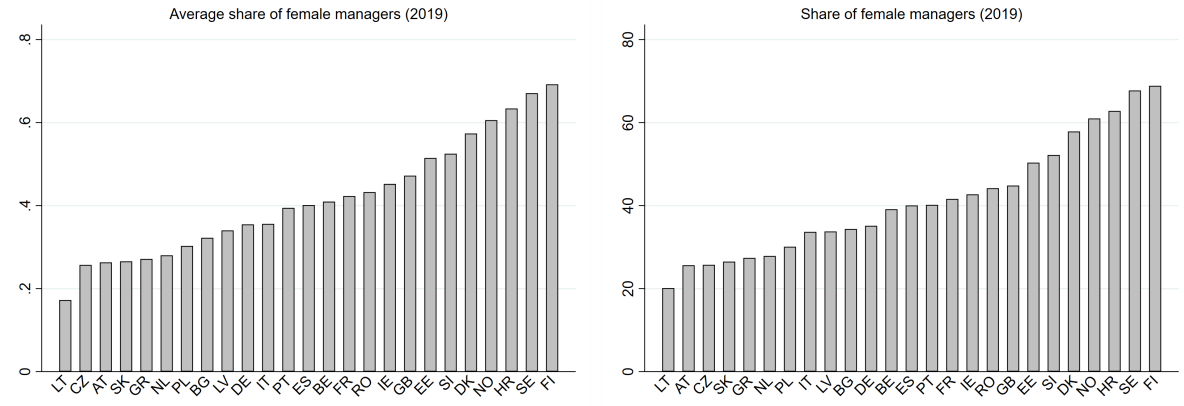
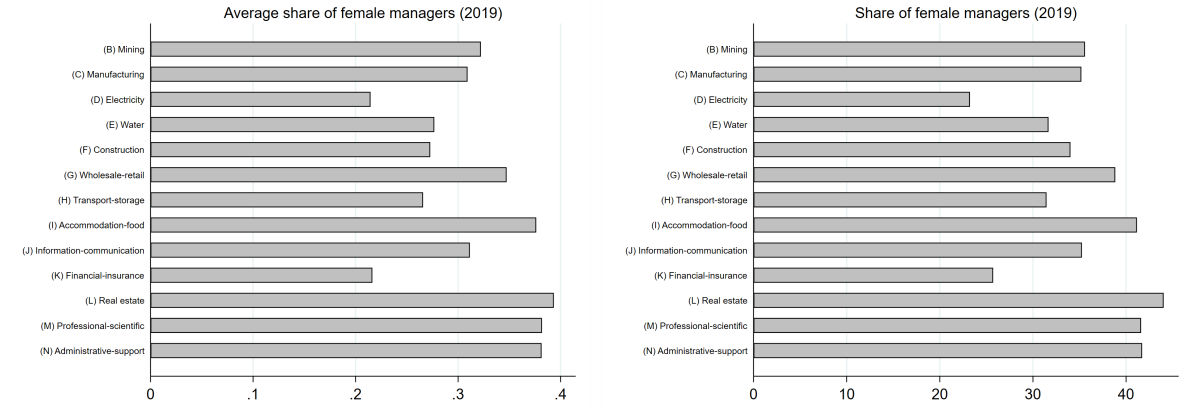
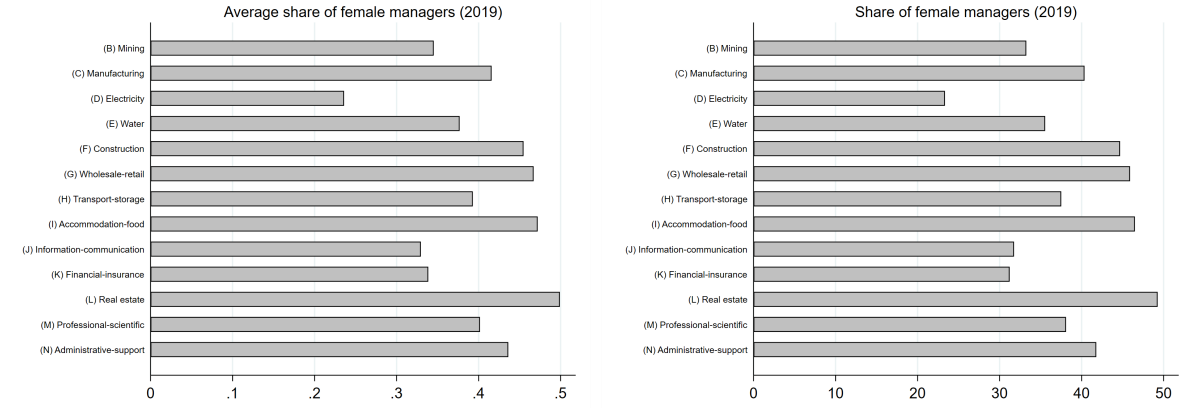


Figure B.4: Share of female managers in senior management for industries in 2019.

All firms



Firms with at least 3 managers



C APPENDIX - Additional distribution tables

Table C.1: Women in senior management in 2010 - cross-country summary

	obs.	share fem. man.		at least ... fem. man.			
		mean	stdev	1	50%	100%	none
AT	87,636	0.216	0.393	0.249	0.245	0.187	0.751
BE	179,408	0.307	0.402	0.426	0.404	0.205	0.574
BG	9,820	0.164	0.362	0.177	0.176	0.153	0.823
CZ	67,742	0.207	0.354	0.291	0.285	0.130	0.709
DE	754,423	0.223	0.399	0.252	0.249	0.195	0.748
DK	64,787	0.221	0.404	0.239	0.238	0.201	0.761
EE	416	0.449	0.482	0.483	0.476	0.416	0.517
ES	489,766	0.231	0.384	0.298	0.286	0.169	0.702
FI	62,081	0.536	0.486	0.562	0.558	0.507	0.438
FR	92,860	0.274	0.431	0.306	0.294	0.245	0.694
GB	592,663	0.590	0.438	0.700	0.680	0.483	0.300
GR	15,582	0.227	0.296	0.453	0.371	0.054	0.547
HR	25,442	0.337	0.462	0.358	0.356	0.317	0.642
IE	59,031	0.609	0.427	0.737	0.708	0.492	0.263
IT	61,000	0.285	0.410	0.375	0.340	0.209	0.625
LT	7,583	0.124	0.314	0.148	0.145	0.104	0.852
LV	2,601	0.326	0.465	0.333	0.332	0.319	0.667
NL	291,463	0.118	0.322	0.119	0.119	0.117	0.881
NO	53,923	0.264	0.435	0.274	0.273	0.252	0.726
PL	65,266	0.162	0.367	0.163	0.163	0.160	0.837
PT	161,902	0.246	0.354	0.379	0.362	0.128	0.621
RO	105,278	0.300	0.423	0.365	0.360	0.238	0.635
SE	38,196	0.310	0.456	0.323	0.322	0.297	0.677
SI	14,663	0.356	0.461	0.392	0.389	0.322	0.608
SK	15,646	0.239	0.368	0.340	0.331	0.147	0.660

All employer firms

Table C.2: Women in senior management in 2019 - cross-country summary

	obs.	share fem. man.		at least ... fem. man.			
		mean	stdev	1	50%	100%	none
AT	126,918	0.208	0.388	0.239	0.235	0.179	0.761
BE	201,520	0.288	0.391	0.405	0.389	0.185	0.595
BG	274,388	0.340	0.454	0.377	0.376	0.304	0.623
CZ	110,103	0.231	0.372	0.313	0.309	0.153	0.687
DE	356,313	0.235	0.397	0.286	0.277	0.190	0.714
DK	101,845	0.215	0.401	0.231	0.230	0.197	0.769
EE	1,049	0.457	0.478	0.500	0.491	0.417	0.500
ES	347,902	0.265	0.409	0.327	0.317	0.206	0.673
FI	81,984	0.518	0.486	0.547	0.543	0.487	0.453
FR	113,252	0.252	0.413	0.292	0.284	0.216	0.708
GB	1,854,869	0.429	0.458	0.508	0.492	0.354	0.492
GR	16,442	0.239	0.345	0.391	0.351	0.112	0.609
HR	35,491	0.416	0.483	0.436	0.435	0.396	0.564
IE	84,294	0.582	0.425	0.726	0.694	0.453	0.274
IT	651,294	0.276	0.418	0.337	0.320	0.226	0.663
LT	60,245	0.166	0.367	0.174	0.173	0.159	0.826
LV	4,451	0.389	0.479	0.407	0.405	0.374	0.593
NL	406,378	0.149	0.352	0.156	0.155	0.143	0.844
NO	62,317	0.324	0.461	0.336	0.336	0.310	0.664
PL	162,155	0.279	0.427	0.322	0.317	0.241	0.678
PT	298,549	0.345	0.367	0.540	0.522	0.155	0.460
RO	174,039	0.398	0.475	0.428	0.423	0.369	0.572
SE	64,993	0.413	0.479	0.439	0.438	0.384	0.561
SI	46,164	0.358	0.449	0.416	0.414	0.300	0.584
SK	131,699	0.259	0.392	0.340	0.336	0.182	0.660

All employer firms

Table C.3: Women in senior management with at least 2 managers - cross-country summary

	obs.	share fem. man.		at least ... fem. man.				
		mean	stdev	1	30%	50%	100%	none
AT	535,554	0.255	0.387	0.344	0.334	0.175	0.656	
BE	1,449,912	0.391	0.365	0.631	0.595	0.181	0.369	
BG	360,937	0.321	0.338	0.539	0.529	0.111	0.461	
CZ	474,523	0.254	0.307	0.458	0.445	0.063	0.542	
DE	2,792,915	0.274	0.394	0.372	0.358	0.186	0.628	
DK	365,525	0.394	0.461	0.448	0.444	0.336	0.552	
EE	2,128	0.562	0.432	0.691	0.672	0.438	0.309	
ES	1,789,411	0.317	0.370	0.494	0.463	0.151	0.506	
FI	616,467	0.645	0.448	0.704	0.695	0.580	0.296	
FR	410,619	0.399	0.428	0.527	0.498	0.278	0.473	
GB	10,960,869	0.599	0.423	0.736	0.706	0.468	0.264	
GR	177,151	0.245	0.301	0.478	0.410	0.059	0.522	
HR	123,454	0.555	0.454	0.642	0.636	0.470	0.358	
IE	1,004,562	0.605	0.424	0.740	0.710	0.481	0.260	
IT	1,937,562	0.325	0.383	0.507	0.450	0.178	0.493	
LT	22,471	0.155	0.265	0.292	0.275	0.036	0.708	
LV	9,408	0.370	0.416	0.500	0.488	0.250	0.500	
NL	1,274,332	0.147	0.341	0.167	0.165	0.129	0.833	
NO	364,532	0.463	0.485	0.489	0.488	0.434	0.511	
PL	222,936	0.317	0.382	0.472	0.453	0.175	0.528	
PT	1,710,382	0.358	0.303	0.655	0.624	0.075	0.345	
RO	448,976	0.444	0.402	0.628	0.606	0.269	0.372	
SE	231,146	0.507	0.470	0.565	0.563	0.445	0.435	
SI	130,545	0.499	0.427	0.641	0.634	0.363	0.359	
SK	417,985	0.296	0.315	0.526	0.514	0.078	0.474	

All employer firms

Table C.4: Women in senior management in 2010 - cross-industry summary

	obs.	share fem. man.		at least ... fem. man.			
		mean	stdev	1	50%	100%	none
B	9,301	0.284	0.416	0.358	0.337	0.222	0.642
C	425,681	0.280	0.414	0.349	0.334	0.216	0.651
D	16,134	0.144	0.321	0.196	0.176	0.106	0.804
E	17,264	0.262	0.406	0.332	0.308	0.206	0.668
F	462,846	0.281	0.423	0.333	0.326	0.232	0.667
G	770,946	0.315	0.432	0.377	0.369	0.255	0.623
H	130,252	0.282	0.418	0.345	0.333	0.226	0.655
I	140,571	0.357	0.440	0.436	0.426	0.283	0.564
J	169,820	0.331	0.434	0.406	0.392	0.264	0.594
K	202,982	0.189	0.376	0.219	0.210	0.165	0.781
L	241,507	0.363	0.445	0.435	0.423	0.294	0.565
M	530,988	0.307	0.432	0.365	0.355	0.255	0.635
N	200,886	0.390	0.452	0.464	0.450	0.321	0.536

All employer firms

Table C.5: Women in senior management in 2019 - cross-industry summary

	obs.	share fem. man.		at least ... fem. man.			
		mean	stdev	1	50%	100%	none
B	13,110	0.322	0.431	0.401	0.377	0.256	0.599
C	606,445	0.309	0.422	0.391	0.372	0.235	0.609
D	25,796	0.215	0.369	0.300	0.268	0.153	0.700
E	29,530	0.277	0.408	0.360	0.334	0.209	0.640
F	767,682	0.273	0.418	0.324	0.318	0.223	0.676
G	1,192,774	0.347	0.442	0.415	0.406	0.282	0.585
H	260,812	0.266	0.410	0.327	0.317	0.210	0.673
I	343,320	0.376	0.445	0.456	0.447	0.299	0.544
J	425,865	0.311	0.428	0.382	0.370	0.248	0.618
K	382,938	0.216	0.392	0.257	0.243	0.184	0.743
L	379,499	0.393	0.449	0.474	0.461	0.315	0.526
M	895,029	0.382	0.454	0.448	0.437	0.321	0.552
N	445,854	0.381	0.452	0.453	0.439	0.315	0.547

All employer firms

Table C.6: Women in senior management with at least 2 managers - cross-industry summary

	obs.	share fem. man.		at least ... fem. man.				
		mean	stdev	1	30%	50%	100%	none
B	90,128	0.415	0.431	0.555	0.511	0.301	0.445	
C	3,671,903	0.400	0.416	0.556	0.519	0.260	0.444	
D	134,839	0.244	0.353	0.406	0.339	0.130	0.594	
E	157,666	0.381	0.412	0.545	0.491	0.247	0.455	
F	3,705,944	0.459	0.440	0.578	0.561	0.344	0.422	
G	5,784,491	0.447	0.419	0.604	0.582	0.296	0.396	
H	1,098,532	0.410	0.418	0.563	0.534	0.273	0.437	
I	1,351,013	0.476	0.403	0.664	0.640	0.295	0.336	
J	1,922,583	0.472	0.426	0.625	0.596	0.334	0.375	
K	1,441,436	0.288	0.406	0.388	0.356	0.207	0.612	
L	2,176,809	0.489	0.427	0.639	0.613	0.345	0.361	
M	4,157,623	0.478	0.429	0.625	0.599	0.345	0.375	
N	2,141,335	0.510	0.426	0.664	0.633	0.368	0.336	

All employer firms

Table C.7: Women in senior management with at least 2 managers - annual summary

	obs.	share fem. man.		at least ... fem. man.				
		mean	stdev	1	30%	50%	100%	none
2005	478,012	0.561	0.441	0.674	0.657	0.451	0.326	
2006	743,388	0.503	0.445	0.616	0.600	0.393	0.384	
2007	858,032	0.492	0.443	0.610	0.592	0.378	0.390	
2008	991,881	0.481	0.439	0.606	0.587	0.363	0.394	
2009	1,139,144	0.481	0.439	0.608	0.587	0.362	0.392	
2010	1,500,356	0.430	0.429	0.567	0.544	0.303	0.433	
2011	1,743,838	0.426	0.424	0.573	0.544	0.293	0.427	
2012	1,964,584	0.406	0.424	0.545	0.517	0.280	0.455	
2013	2,027,604	0.411	0.423	0.554	0.526	0.281	0.446	
2014	2,253,640	0.410	0.419	0.559	0.531	0.271	0.441	
2015	2,254,504	0.424	0.420	0.576	0.545	0.283	0.424	
2016	2,312,104	0.447	0.423	0.600	0.572	0.306	0.400	
2017	2,370,651	0.456	0.420	0.617	0.587	0.307	0.383	
2018	2,353,195	0.464	0.420	0.625	0.597	0.315	0.375	
2019	2,395,532	0.468	0.420	0.629	0.601	0.318	0.371	
2020	2,447,837	0.463	0.420	0.623	0.596	0.314	0.377	

All employer firms

D APPENDIX Unrestricted data

Table D.1: Annual frequency of all management info available

	$< 30\%$ **female**	$> 30\%$ **female**	**Total**
2005	1,231,396	1,007,501	2,238,897
2006	2,187,447	1,483,184	3,670,631
2007	2,588,817	1,731,943	4,320,760
2008	3,074,365	2,011,845	5,086,210
2009	3,632,913	2,381,279	6,014,192
2010	5,489,240	3,149,195	8,638,435
2011	6,717,366	3,852,089	10,569,455
2012	7,021,613	4,128,992	11,150,605
2013	7,199,519	4,375,583	11,575,102
2014	7,816,492	4,743,925	12,560,417
2015	7,997,639	4,875,107	12,872,746
2016	13,129,463	7,515,208	20,644,671
2017	13,873,694	8,044,703	21,918,397
2018	14,127,434	8,279,898	22,407,332
2019	14,236,927	8,269,391	22,506,318
2020	14,720,616	8,474,329	23,194,945
Total	125,044,941	74,324,172	199,369,113

All firms with management available. Column 'female' contains firm-year observations where more than 30% of senior managers is female, column male' contains firm-year observations where less than 30% of senior managers is female.