Female Hires and the Success of Start-up Firms*

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Abstract

In this paper we investigate the relationship between females among the first hires of start-up companies and business success. Our results show that firms with female first hires have a higher share of female workers at the end of the first year after entry. Further, we find that firms with female first hires are more successful and stay longer in the market. We conclude that our results support the hypothesis that gender-diversity in leading positions is an advantage for start-up firms.

Keywords: Firm survival, profitability, female employment, discrimination, market test, matched employer-employee data
JEL classification: J16, J71, L25

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1 Introduction

Do women make better managers? This question generates heated discussions on whether the more collaborative, democratic, or problem focused approach typically adopted by female leaders outperforms the confrontational style of male managers.[1] Hard evidence is tough to find, though, as a 'glass ceiling' prevents women from advancing to senior positions and females are highly under-represented among chief executive officers (CEOs) of top corporations (Bertrand, 2009). Studies testing the effects of gender diversity in corporate boards or top management thus often report ambiguous results plagued by lack of statistical power (Adams and Ferreira, 2009; Smith et al., 2005).

In this paper we address the question form a different angle. We investigate the relationship between females among the first hires of start-up companies and business success. Start-ups are small, dynamic, and risky enterprizes, which are particularly sensitive to business decisions. A single bad decision can lead straight to the exit. So if there is an effect of gender-diversity in leading ranks, one should see it in start-ups. In addition, first hires take key positions in start-up firms. They closely collaborate with the founder, have to be flexible enough to assume different roles, and face the incentive of steep promotions, if the business succeeds. Hundreds of special advice pages and web-blogs provide tips on how to select the first employee.[2] Interestingly, Hellmann and Puri (2002) also find that venture capitalists support start-ups beyond their role as financial intermediaries in the development of human resources and selection of the CEO.

We measure the success of start-up firms by their survival. Thus our setup is charac-

[1] See e.g., *New York Times*, Interview with Carol Smith, July 25, 2009.

[2] See e.g., *Wall Street Journal*, http://guides.wsj.com/small-business/hiring-and-managing-employees/how-to-hire-your-first-employee/.

terized by a clear timing of events: start-ups hire employees and the success is revealed subsequently. This is an advantage over studies based on established corporations where it is often unclear whether excellent performance triggers the entry of female managers or vice versa. We use information on start-ups from a large administrative database in Austria. The data do not allow to identify the owner of the firms but provide detailed longitudinal information about workforce and payroll. Although no exact occupational categories are given, the data also provide valuable evidence on a link between first hires and leadership positions. Average wages among workers hired in the first few months after firm entry are significantly higher than among workers hired later on.[3] A further advantage is that we presumably observe lower executive levels as the share of female first hires is relatively high. About 70% of the start-ups have a female among first hires.

In the empirical analysis we ask the following two questions. Do women among the first hires have an impact on the gender composition of the workforce while the firm is still growing? Do females among first hires have an effect on firm survival? Our results show that firms with female first hires have a higher share of female workers at the end of the first year after entry. Either they are a positive signal which encourages other female workers to join the company or they actively influence the selection process. Further, we find that firms with female first hires are more successful and stay longer in the market. We conclude that our results support the hypothesis that gender-diversity in leading positions is an advantage for start-up firms. Thus the absence of women from leading ranks can be interpreted as evidence for mistake-based discrimination according to which women are routinely undervalued (Wolfers, 2006).

[3]Cardoso and Winter-Ebmer (2010) use large administrative data from Portugal where data on ownership is incompletely observed and replace as necessary the owner by the person with the highest wage.

2 Data and Definitions

We analyze start-up firms constructed from the Austrian Social Security Database (ASSD). This administrative register covers employment careers and earnings of all private sector workers in Austria since the early 1970's (Zweimüller et al., 2009). Every employment spell in the ASSD is linked to a firm identifier, which allows us to exploit the matched employer-employee structure of the data. Firm identifiers are observed from the entry of the first employee to the exit of the last workers. As the identifiers are assigned for purely administrative purposes we use a worker-flow approach (Benedetto et al., 2007) to identify start-ups of enterprizes from identifier re-assignments or spin-offs of smaller units of existing firms. Similarly, to determine survival times we distinguish exit events due to firm closure, identifier re-assignment or take-over. As the worker-flow approach only makes sense for firms of a minimum size, we restrict the sample to start-ups hiring at least 5 workers in the first year. We further restrict the sample to firms surviving for at least one year after entry. In addition, we exclude industries with high seasonal labor demand variation such as construction and tourism. Our final sample contains 29,879 start-up firms. Additional details about the database and summary statistics are given in Weber and Zulehner (2009).

In terms of time invariant firm characteristics the ASSD provides regional and industry indicators, at the postal code and 4 digit NACE levels, respectively. At any day in the life of a firm all remaining information can be collected from personal characteristics, employment and earnings careers of its workforce. Figure 1 shows average wages by quarter after firm entry for different survival groups. To control for inter-industry wage differences and time trends all wages are taken relative to the 4 digit industry and year average. The graph shows very clearly that wages among workers hired in the first and second quarters are significantly higher than in later quarters, for all firms, but also

for firms surviving at least 5 or 10 years. This motivates our definition of first hires, which applies three criteria. First hires enter the start-up firm in the first six months of firm existence. Second, first hires are restricted to be among the five workers with highest wages in year one. Finally, because the sample includes many small firms, the wage of first hires has to be above the firm-level median wage in the first year.[4] Our main explanatory variable is an indicator equal to one if there is a women among the first hires.[5]

3 Empirical results

To answer the first question, whether women among first hires have an impact on the gender composition while a firm is still growing, we regress the share of female workers still employed by the end of the first year on the female first hires dummy variable as well as year, quarter, industry and region effects. Our start-up sample has a share of female workers of 46 percent on average. Table 1 reports the regression results in two specifications and two samples. Column (1) reports that a women among the first hires significantly increases the share of female workers by the end of the first year. The increase is of about 29 percentage points and highly significant. If we additionally control for workforce characteristics such as firm size and turnover in column (2), this effect is reduced to 24 percentage points. This seems to be an extremely large effect. However, we have to take into account that female first hires are likely to remain in the workforce until the end of the first year. For the smallest firm with 5 workers, one women in the first hires could thus mechanically increase the female share by 20 percentage points. To mitigate this mechanical relationship, we reduce the sample to

[4]The mean size of start-ups is 10.82 workers.

[5]We experimented with alternative definitions such as an indicator for a female majority among first hires. Our results did not change.

larger firms with at least 10 workers. The results, in columns (3) and (4), show that the effects are with 25 and 19 percentage points somewhat smaller, but still substantial.

To answer our second question, whether females among first hires have an effect on firm survival, we relate female first hires to firm survival using a Cox proportional hazard model with the same set of controls as above. The median survival time is 6.25 years among starts-ups. Table 2 reports the results for two specifications and two samples. We find a strong and negative effect of female first hires on the exit rate of start-ups. As column (1) shows, the effect corresponds to a decrease in the exit hazard of 19 percent. In a companion paper (Weber and Zulehner, 2009), we show that the share of female workers at the end of the first year has a strong positive effect on firm survival. In Table 1, we have demonstrated that female first hires increase the share of female workers. The effect of female first hires on firm survival can be seen as a combination of the direct effect of female first hires and an indirect effect through the relative increase in the female workforce. To disentangle these two effects, we separately control for female first hires and the share of female workers in column (2). Although the effect of the share of female workers on firm survival is considerable, female first hires still contribute significantly to a reduction of the exit hazard of 11 percent. If we again reduce the sample to larger firms with at least 10 employees, in columns (3) and (4), the results are basically unchanged. Here, female first hires reduce the exit hazard by 19 percent, and by 14 percent after controlling for the share of female workers.

4 Conclusion

We have established that female first hires influence the development of human resources by increasing the share of female workers in the start-up phase of a firm. We have also found that there is a strong significant effect of female first hires on the success of a

firm measured by its survival. Based on the evidence that first hires earn higher wages than average workers, we argue first hires likely hold key positions and are involved in important business decisions. Our results can therefore be taken as evidence for the role of gender-diversity in leading ranks.

A growing literature demonstrates systematic gender differences in risk aversion and competitiveness (Croson and Gneezy, 2009). Interestingly, Bartling et al. (2009) also demonstrate that individuals with egalitarian preferences are reluctant to self-select into competitive environments. Combining our results with these findings, one can conclude that gender induced differences in managerial style matter for business success. Although our applications does not explicitly consider top-level CEOs, a projection our conclusions to a scenario where women are highly under-represented would imply that glass ceilings are inefficient and probably due to mistake-based discrimination (Wolfers, 2006).

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Table 1: Effect of Female First Hires on Share of Female Workers

	All New Firms		New Firms ≥10	
Variable	(1)	(2)	(3)	(4)
Female First Hires	0.288	0.242	0.247	0.193
	(0.003)	(0.003)	(0.005)	(0.005)
Share of White Collar Workers		0.201		0.220
		(0.005)		(0.009)
Share from Employment		0.078		0.082
		(0.010)		(0.019)
Share from Unemployment		0.049		0.016
		(0.011)		(0.020)
Share with Wage Gain		-0.022		-0.058
		(0.008)		(0.016)
Share with Wage Loss		-0.179		-0.260
		(0.009)		(0.020)
Turnover Rate		-0.008		-0.008
		(0.002)		(0.005)
Share from Largest Group		-0.075		-0.111
		(0.010)		(0.017)
Firm Size		0.047		0.046
		(0.008)		(0.010)
Median Wage		-0.162		-0.189
		(0.003)		(0.006)
Average Worker Age		-0.000		0.001
		(0.000)		(0.001)
Observations	29879	29879	8996	8996
Adjusted R-squared	0.550	0.606	0.558	0.631

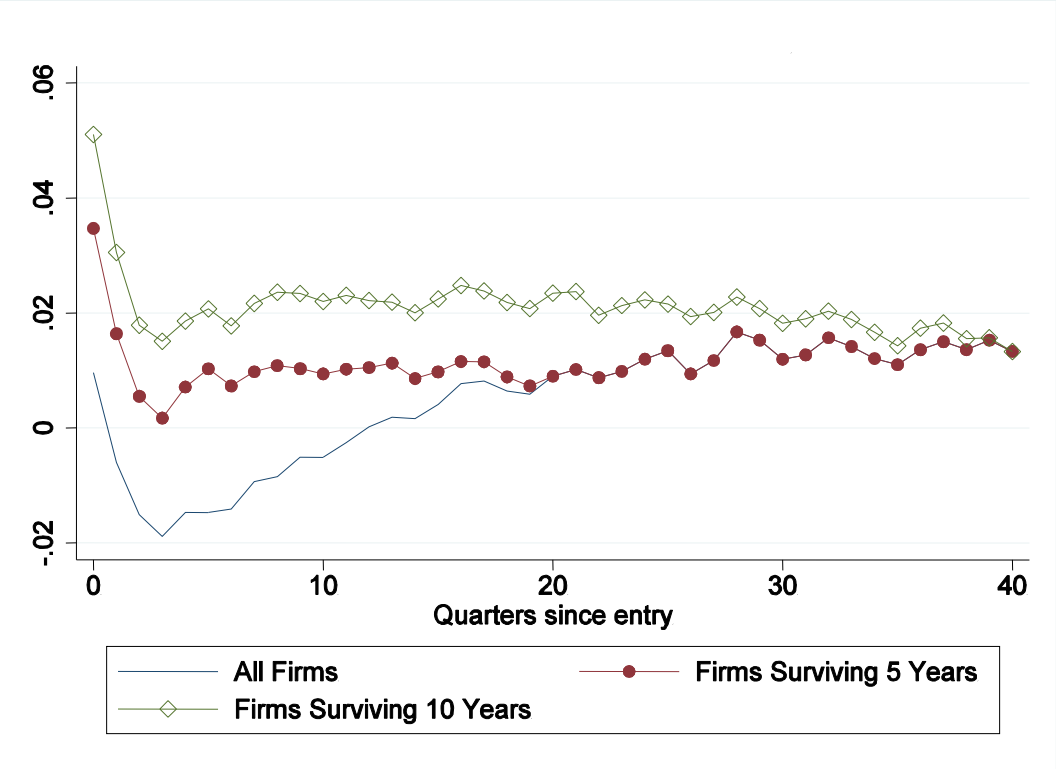
Notes: Estimation results from linear regressions. Dependent variable is the share of female workers in quarter 4; standard errors in parenthesis. Female first hires is an indicator equal to one if there is at least one women among first hires. All regressions control for 22 year effects, 3 quarter effects, 160 industry effects, and 35 region specific effects.

Table 2: Effect of Female First Hires on Firm Survival

	All New Firms		New Firms ≥10	
Variable	(1)	(2)	(3)	(4)
Female First Hires	-0.190	-0.107	-0.187	-0.144
	(0.027)	(0.031)	(0.051)	(0.057)
Share of Female Workers		-0.333		-0.217
		(0.056)		(0.117)
Share of White Collar Workers	-0.057	0.012	-0.271	-0.223
	(0.043)	(0.044)	(0.089)	(0.092)
Share from Employment	-0.708	-0.682	-1.107	-1.089
	(0.089)	(0.089)	(0.197)	(0.197)
Share from Unemployment	-0.136	-0.118	-0.277	-0.273
	(0.088)	(0.088)	(0.191)	(0.190)
Share with Wage Gain	0.372	0.371	0.515	0.498
	(0.077)	(0.077)	(0.178)	(0.178)
Share with Wage Loss	0.626	0.568	1.147	1.086
	(0.083)	(0.084)	(0.206)	(0.207)
Turnover Rate	0.376	0.372	0.235	0.232
	(0.020)	(0.020)	(0.046)	(0.046)
Share from Largest Group	-0.607	-0.634	-0.235	-0.259
	(0.092)	(0.092)	(0.194)	(0.195)
Firm Size	-0.658	-0.635	-0.315	-0.301
	(0.127)	(0.127)	(0.130)	(0.129)
Median Wage	-0.203	-0.265	-0.009	-0.056
	(0.034)	(0.036)	(0.073)	(0.078)
Average Worker Age	0.017	0.017	0.014	0.014
	(0.002)	(0.002)	(0.005)	(0.005)
Observations	29879	29879	8996	8996
log-likelihood	-74216	-74196	-18808	-18806

Notes: Estimation results from Cox regressions. Dependent variable is the survival time in quarters. Standard errors in parenthesis. Female first hires is an indicator equal to one if there is at least one women among first hires. All regressions control for 22 year effects, 3 quarter effects, 160 industry effects, and 35 region specific effects.

Figure 1: Survival Groups - Log Mean Wage



Notes: Firms correspond to firm identifiers in the Austrian Social Security Database.