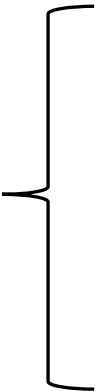# Labor Hiring and Stock Returns: the Importance of the Sales and Marketing Workforce

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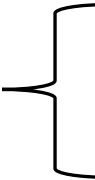2021 China International Conference in Finance

王念硕

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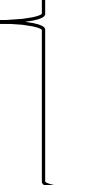- Research contents
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2. Research design

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1. Introduction

Background

1. Labor is a fundamental input of every economic activity. Economists have long recognized the importance of labor heterogeneity. However, they are silent about the connections existing among the different functions that labor performs within a firm.
2. Among these functions, sales & marketing (S&M) plays the unique role of "matching" the supply resulting from firms' inner operations to the potential demand in the product and service markets. In this sense, the S&M function is, among all labor functions, the closest to a firm's revenue.

1. Introduction

Motivation

1. Although many scholars have studied the relationship between labor force and corporate performance and value, there is no research on the relationship between S&M function and corporate performance.

1. Introduction

Research question

1. Can S&M labor growth predict future company performance?

   Yes

2. Can S&M labor growth predict future stock return?

   Yes

3. What is the premium source of SM labor growth?

   Risk exposures

1. Introduction

Research Contents

1. Firstly, We find that firms with higher growth in S&M workers have higher future revenue growth, as measured by growth in total sales, and higher future profitability, as measured by ROE.

2. Next, our regression analysis shows that firms with higher growth in the S&M workforce have higher future stock returns.

3. To understand the possible economic mechanisms underlying the documented cross-sectional return pattern, we find that the majority of the return spread generated by the growth in the S&M workers can be explained by risk exposures.

1. Introduction

Related researches

1. Belo, Lin, and Bazdresch (2014) find evidence that firms with higher hiring rates earn lower future returns, consistent with an investment-based model with stochastic labor adjustment costs.

2. Belo, Li, Lin, and Zhao (2017) show that the negative relationship between firms' hiring rates and future stock returns in the cross-section is much stronger in industries that rely more on high-skill employees than low-skill employees.

3. Zhang (2019) finds that firms with a higher wage share of routine-task labor have lower expected stock returns.

1. Introduction

Contribution

1. This article is the first paper to highlight the importance of workers in the S&M function for understanding firms' accounting- and market-based performance.

2. Research design: Variable

A firm's workforce is classified broadly into five categories according to the types of functions that employees perform within the firm: (i) Production; (ii) R&D; (iii) Sales and Marketing; (iv) Administration; and (v) Finance.

S&M growth is a year-on-year change in the number of S&M employees.

2. Research design: Data

Data Source: CSMAR、Wind financial database、RESSET

Period: 1999.12 to 2019.12.

Sample: All A-share manufacturing stocks. The manufacturing sector accounts for about 60% of the number and 40% of market capitalization of all listed firms. The production life-cycle of a typical manufacturing firm starts with tasks performed by R&D labor, it is followed by the actual creation of products and services, accomplished by labor in the production function, and ends with sales, the responsibility of the S&M team.

We require that a listed firm reports its workforce composition in its annual report.

2. Research design: method

Univariate portfolio analysis
Bivariate sort analysis
Fama-MacBeth regressions

3.1 Empirical result: S&M growth and profitability

		Panel A: Future revenue growth	
	(1)	(2)	(3)
S&M workforce growth		0.04***	0.03**
		(7.80)	(3.26)
Total worker growth	0.05		
	(1.82)		
Production worker growth			0.02
			(0.65)
R&D worker growth			0.00
			(0.05)
Administration worker growth			0.01
			(1.60)
Finance worker growth			-0.00
			(-0.03)

Model (2) shows that labor hiring in S&M is a strong positive predictor of future revenue growth.
When we include all five types of labor in model (3), we find that only S&M labor growth has predictive power for future revenue growth.

3.1 Empirical result: S&M growth profitability

	Panel A: Future revenue growth			Panel B: Future ROE		
	(1)	(2)	(3)	(4)	(5)	(6)
S&M workforce growth		0.04***	0.03**		0.02***	0.02**
		(7.80)	(3.26)		(4.01)	(2.99)
Revenue growth	0.01	0.03	0.02			
	(0.25)	(0.79)	(0.40)			
ROE				0.47***	0.50***	0.46***
				(8.48)	(7.74)	(11.39)
Asset growth	0.32***	0.34***	0.36***	0.07**	0.07**	0.06**
	(7.24)	(7.04)	(4.71)	(3.06)	(3.50)	(2.89)
Total worker growth	0.05			0.03**		
	(1.82)			(3.46)		
Production worker growth			0.02			0.00
			(0.65)			(0.11)

The results are qualitatively similar if we consider profitability (ROE) instead of revenue growth as a measure of accounting performance.
In summary, these findings support that labor hiring in the S&M function plays an important role in generating firms' revenue and sustaining its profitability in the near future.

3.2 Empirical result: S&M growth and stock returns

	(1)	(2)	(3)	(4)	(5)
S&M worker growth				0.002***	0.003***
				(3.59)	(3.79)
Total worker growth		0.001	0.002*		
		(0.89)	(2.01)		
Production worker growth					-0.001
					(-1.21)
R&D worker growth					0.001
					(0.96)
Administration worker growth					0.000
					(0.38)
Finance worker growth					-0.000
					(-0.45)

The model (2) indicates that the growth rate of total labor is not related to returns, after controlling both size and value.
In model (4), we find that this variable strongly and positively predicts returns.

3.2 Empirical result: S&M growth and stock returns

	(1)	(2)	(3)	(4)	(5)
S&M worker growth				0.002***	0.003***
				(3.59)	(3.79)
Total worker growth		0.001	0.002*		
		(0.89)	(2.01)		
Production worker growth					-0.001
					(-1.21)
R&D worker growth					0.001
					(0.96)
Administration worker growth					0.000
					(0.38)
Finance worker growth					-0.000
					(-0.45)

In model (5), we consider the growth rates in all the five categories of workers and find that only the growth rate in S&M workers can predict returns.

In summary, a higher growth in S&M workers not only predicts higher revenue-growth and profitability, but also higher stock returns.

3.2 Empirical result: S&M growth and stock returns

Sorting Variable	Low	2	3	4	High	High-Low
Growth rate of S&M worker	0.53	0.73	0.89	0.81	1.17	0.64***
	(0.72)	(1.00)	(1.26)	(1.24)	(1.66)	(3.57)
Growth rate of total worker	0.66	0.87	0.78	0.97	0.90	0.24
	(0.90)	(1.20)	(1.13)	(1.44)	(1.27)	(1.37)
Growth rate of total asset	0.77	0.72	1.07	1.01	0.73	-0.04
	(1.03)	(1.00)	(1.54)	(1.51)	(1.00)	(-0.18)

The results in Table 3 shows that the growth rate in sales and marketing workers shows a strong and positive predictive power on future returns. This analysis show that S&M employees are an important determinant of future return predictability.

3.3 Empirical result: Risk exposures

	Low	2	3	4	High	High-Low
Panel C: FF5 factor model						
MKT	1.01***	1.05***	1.00***	0.97***	1.03***	0.02
	(22.84)	(26.61)	(26.69)	(29.77)	(24.70)	(0.63)
SMB	0.51***	0.50***	0.53***	0.40***	0.48***	-0.03
	(6.40)	(5.35)	(5.49)	(3.87)	(4.22)	(-0.33)
HML	-0.15	-0.05	-0.12	-0.24**	-0.12	0.04
	(-1.77)	(-0.57)	(-1.21)	(-2.77)	(-1.13)	(0.43)
RMW	-0.09	0.01	0.18	0.26	0.04	0.13
	(-0.61)	(0.08)	(0.94)	(1.84)	(0.22)	(1.00)
CMA	0.13	0.19	0.28	0.37*	-0.11	-0.23*
	(0.82)	(1.28)	(1.43)	(2.35)	(-0.64)	(-1.99)
Alpha	-0.22	-0.04	0.13	0.15	0.43*	0.65***
	(-1.28)	(-0.24)	(0.76)	(0.85)	(2.01)	(3.77)
Observations	228	228	228	228	228	228
Adjusted R^2	0.906	0.911	0.886	0.887	0.883	0.105

	Low	2	3	4	High	High-Low
Panel D: CH3 factor model						
MKT	1.02***	1.05***	1.01***	0.97***	1.02***	0.01
	(35.74)	(43.81)	(36.18)	(28.46)	(31.01)	(0.27)
SMB	0.53***	0.50***	0.57***	0.45***	0.43***	-0.10
	(9.00)	(10.47)	(11.11)	(7.27)	(6.51)	(-1.03)
VMG	-0.27***	-0.16*	-0.05	-0.06	-0.16*	0.11
	(-3.50)	(-2.41)	(-0.81)	(-0.97)	(-2.12)	(1.30)
Alpha	0.03	0.09	0.11	0.13	0.59**	0.56*
	(0.14)	(0.60)	(0.75)	(0.76)	(2.80)	(2.48)
Observations	228	228	228	228	228	228
Adjusted R^2	0.948	0.956	0.934	0.923	0.918	0.058

The 3-factor model CH3 performs better than the standard 5-factor. However, while this model can help to partially explain the return spread generated by the growth in S&M workers, it still leaves a large and significant portion of the return spread unexplained.

3.4 Empirical result: The effect of earning announcements

	Low	2	3	4	High	High-Low
Panel A: Excluding 5-day returns around earnings announcement						
Ex-Ret	0.51	0.72	0.88	0.69	1.10	0.59***
	(0.76)	(1.11)	(1.40)	(1.18)	(1.74)	(3.48)
CAPM Alpha	0.03	0.23	0.42*	0.25	0.63**	0.60***
	(0.14)	(1.15)	(2.04)	(1.28)	(2.81)	(3.61)
FF5 Alpha	-0.17	0.03	0.19	0.10	0.42*	0.59***
	(-0.81)	(0.17)	(1.05)	(0.51)	(1.97)	(3.62)
CH3 Alpha	-0.02	0.09	0.09	0.02	0.47*	0.49*
	(-0.08)	(0.54)	(0.54)	(0.11)	(2.13)	(2.20)

For each stock, we identify its earnings announcement date and construct a five-day window centered around this date. We then re-construct the monthly returns by excluding this announcement window.
The expected increase in profitability may be incorporated into stock prices well in advance of the quarterly earning announcement, resulting in negligible earnings announcement surprises related to the growth in S&M employees.

3.5 Empirical result: Premium sources of the S&M

Panel B: A 4-factor model

	Low	2	3	4	High	High-Low
MKT	1.00***	1.05***	1.00***	0.98***	1.04***	0.04
	(35.29)	(42.72)	(35.43)	(29.21)	(30.92)	(1.58)
SMB	0.53***	0.50***	0.57***	0.44***	0.43***	-0.10
	(11.21)	(11.18)	(11.23)	(7.67)	(7.84)	(-1.68)
VMG	-0.28***	-0.16**	-0.05	-0.06	-0.16*	0.12
	(-4.05)	(-2.61)	(-0.84)	(-0.92)	(-2.07)	(1.77)
GMS	-0.39***	-0.15	-0.09	0.20	0.49***	0.89***
	(-4.44)	(-1.36)	(-0.68)	(1.51)	(4.54)	(7.36)
Alpha	0.14	0.14	0.14	0.07	0.44*	0.30
	(0.78)	(0.92)	(0.82)	(0.42)	(2.37)	(1.73)
Observations	228	228	228	228	228	228
Adjusted R^2	0.952	0.956	0.934	0.924	0.924	0.279

We construct a new risk factor based on log-growth rate in the S&M
the alpha of the high-minus-low portfolio becomes insignificant at the 5-percent level.
Our results indicate that the addition of a fourth risk factor does indeed help to explain the return spread between portfolios sorted by the growth rate in S&M employees.
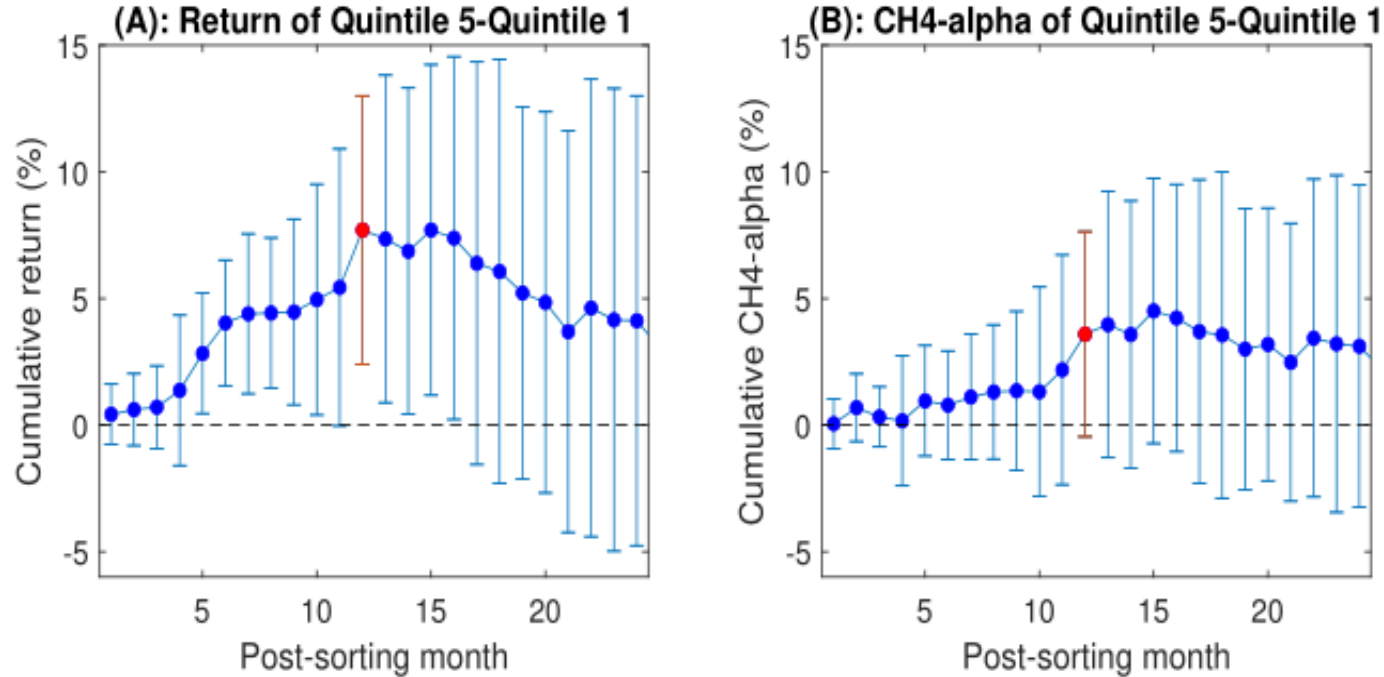
3.5 Empirical result: Premium sources of the S&M

To explore the possibility of mispricing, we keep track of the S&M-growth-sorted portfolios over a longer period of time.

Intuitively, if the return spread is mainly due to mispricing, then we would expect some degree of reversal over an extended period.

Figure 2 plots the 24-month window of the cumulative return spread for portfolios sorted by the growth rate in S&M workforce.

3.5 Empirical result: Premium sources of the S&M

(A): Return of Quintile 5-Quintile 1 — Cumulative return (%) vs Post-sorting month

(B): CH4-alpha of Quintile 5-Quintile 1 — Cumulative CH4-alpha (%) vs Post-sorting month

The return spread within the first year indeed partially reverses in the second year.

To control potential change in risk exposure, we remove the effect of risk factors. Note that while the alpha increases within the first year, it remains relatively flat in the second year.

The remaining unexplained return spread does not seem to reverse in the following year. We interpret this lack of reversal in alphas as evidence against mispricing.

3.6 Empirical result: The effect of workforce skills

Panel A: Manufacturing stocks

	A1: Low-skill industries						A2: High-skill industries					
	Low	2	3	4	High	High-Low	Low	2	3	4	High	High-Low
Skill	0.24***	0.24***	0.24***	0.24***	0.24***	0.00	0.36***	0.36***	0.36***	0.36***	0.36***	-0.01
	(11.21)	(9.92)	(9.89)	(10.28)	(9.66)	(0.43)	(10.83)	(10.79)	(11.28)	(11.08)	(10.90)	(-1.35)
Ex-Ret	0.43	0.97	0.89	0.86	1.03	0.60*	0.56	0.73	0.77	0.99	1.23	0.67**
	(0.59)	(1.32)	(1.24)	(1.34)	(1.44)	(2.36)	(0.74)	(0.99)	(1.09)	(1.42)	(1.71)	(3.03)
CAPM Alpha	-0.10	0.45	0.37	0.36	0.49	0.59*	0.01	0.17	0.25	0.50	0.71**	0.70**
	(-0.42)	(1.96)	(1.74)	(1.75)	(1.89)	(2.38)	(0.04)	(0.67)	(1.01)	(1.85)	(2.87)	(3.21)
FF5 Alpha	-0.30	0.18	0.14	0.24	0.32	0.62*	-0.19	-0.08	0.03	0.25	0.46	0.65**
	(-1.63)	(0.80)	(0.70)	(1.18)	(1.29)	(2.42)	(-0.92)	(-0.40)	(0.16)	(1.05)	(1.91)	(3.26)
CH3 Alpha	-0.04	-0.06	-0.04	0.11	0.32	0.36	0.12	0.27	0.14	0.39	0.69**	0.57*
	(-0.13)	(-0.28)	(-0.23)	(0.54)	(1.25)	(0.92)	(0.53)	(1.48)	(0.78)	(1.64)	(2.72)	(2.53)
CH4 Alpha	0.13	0.01	-0.01	0.10	0.15	0.02	0.21	0.31	0.09	0.30	0.57*	0.36
	(0.42)	(0.04)	(-0.02)	(0.50)	(0.64)	(0.07)	(0.84)	(1.57)	(0.53)	(1.29)	(2.43)	(1.62)

We explore how the workforce skills may affect the return spread generated by the growth in S&M workforce.

The return spread is 0.60% per month for low-skill industries, and 0.67% for high-skill industries. Both of these return spreads are insignificant in the 4-factor model, following the same pattern as in the main analysis of the full manufacturing sample.

3.6 Empirical result: The effect of workforce skills

Panel B: Non-manufacturing stocks

	B1: Low-skill industries						B2: High-skill industries					
	Low	2	3	4	High	High-Low	Low	2	3	4	High	High-Low
Skill	0.25***	0.26***	0.26***	0.26***	0.27***	0.01	0.54***	0.52***	0.54***	0.52***	0.54***	-0.00
	(8.84)	(8.45)	(7.03)	(7.72)	(7.80)	(1.65)	(9.88)	(10.52)	(10.77)	(11.80)	(10.19)	(-0.08)
Ex-Ret	0.25	0.44	0.58	0.34	0.93	0.68**	0.24	0.33	0.55	0.35	0.34	0.10
	(0.33)	(0.58)	(0.74)	(0.46)	(1.36)	(3.04)	(0.33)	(0.50)	(0.83)	(0.54)	(0.45)	(0.39)
CAPM Alpha	-0.30	-0.12	0.02	-0.20	0.40	0.70**	-0.29	-0.15	0.04	-0.12	-0.18	0.11
	(-1.20)	(-0.51)	(0.05)	(-0.90)	(1.69)	(3.20)	(-1.08)	(-0.60)	(0.17)	(-0.48)	(-0.73)	(0.42)
FF5 Alpha	-0.29	-0.29	-0.08	-0.22	0.30	0.59**	-0.40	-0.21	0.01	-0.26	-0.46	-0.06
	(-1.41)	(-1.17)	(-0.26)	(-1.03)	(1.28)	(2.67)	(-1.75)	(-0.84)	(0.06)	(-1.06)	(-1.86)	(-0.23)
CH3 Alpha	-0.40	-0.43	-0.43	-0.35	0.29	0.69**	0.17	0.19	0.32	0.11	0.09	-0.07
	(-1.70)	(-1.69)	(-1.58)	(-1.38)	(1.37)	(2.78)	(0.72)	(0.78)	(1.29)	(0.38)	(0.31)	(-0.22)
CH4 Alpha	-0.24	-0.35	-0.31	-0.25	0.30	0.54*	0.16	0.26	0.25	-0.11	-0.03	-0.18
	(-1.03)	(-1.40)	(-1.23)	(-1.04)	(1.43)	(2.21)	(0.62)	(1.00)	(0.94)	(-0.46)	(-0.09)	(-0.52)

The return spread generated by growth in the S&M workforce is significant only for the low-skill non-manufacturing industries.

On average, worker skills of manufacturing industries are lower than those of non-manufacturing industries. All manufacturing stocks and low-skill non-manufacturing stocks exhibit relatively low level of worker skills.

In sum, the return spread associated with the growth in S&M workforce is significant only for the relatively low-skill industries.

4. Conclusion

1. We show that growth rate in S&M employees has strong predictive powers for revenue growth, profitability, and stock returns.
2. We find that existing risk factors can explain only a small fraction of the return spread generated by sorting on the growth rate in S&M employees. Adding a new risk factor can explain a large portion of the return spread.
3. We also find that the return spread exists mainly for low-skill industries, but not for high-skill industries..

5. Inspiration

1. 公司员工作为企业的无形资产之一，对于公司绩效、股票收益都有显著的影响，这方面的研究还很少，可以深入探讨。
2. 研究异象因子，可以从预测公司未来绩效出发。倘若某个变量可以预测公司未来绩效，而未来绩效与未来股票收益有关，那么逻辑上来说，该变量将可以预测股票未来回报。这方面可以参考一些公司金融的论文。
3. 这篇文章关于溢价来源机制探讨存在一些问题，其中风险暴露和错误定价的检验方式及解释与以前阅读过的文献有矛盾。