Labor Market Networks and Asset Returns

Joon Woo Bae
CICF 2021

王健
2020-07-22

Content

- Introduction
  - Background & Motivation
  - Question
  - Research content
  - Related researches
  - Contribution
- Data & Variables
- Empirical results
- Conclusion

1. Introduction

Background & Motivation

- Labor is a crucial factor for firms' production activities.
- Previous research mostly focuses on the standalone effect of the labor heterogeneity and shows that the heterogeneity in labor input has important implications for asset prices.
- The labor heterogeneity also implies that firms with overlapping labor skill requirements interact with each other in the labor market through competition for talents or adaptation of technologies that enhances the productivity of a common subset of their employees.

1. Introduction

Background & Motivation

- Therefore, in this paper we first introduce a measure of labor market connectivity based on the similarity in the composition of occupational characteristics.
- And we investigate the impact of labor market connectedness on the cross-sectional pricing of firms' assets and industry portfolios.

1. Introduction

Question: how will labor market connectedness affect cross-sectional pricing of firms' assets and industry portfolios?

Sub-questions:

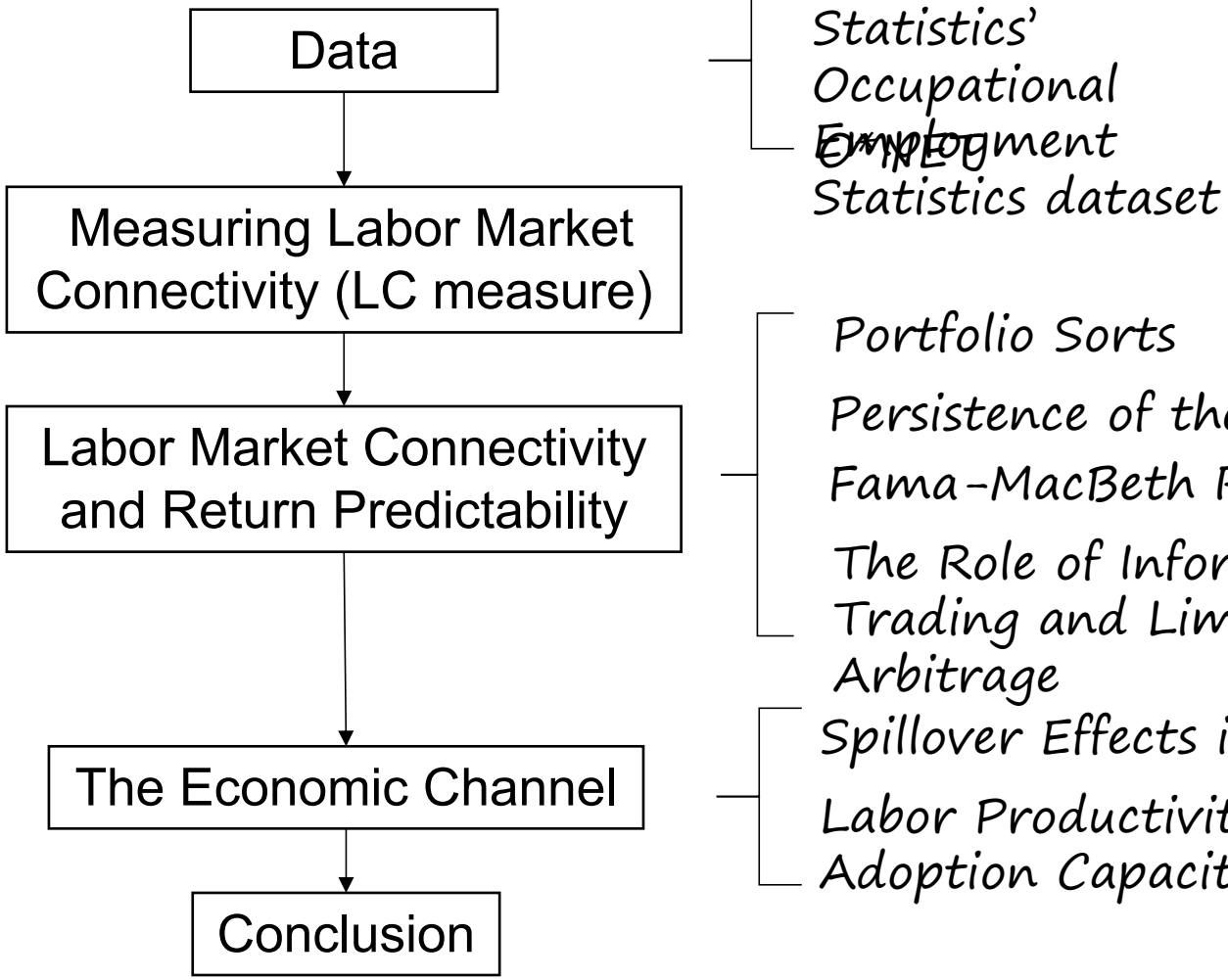
- How to measure the industry connectedness?
- How will stock returns and real quantities be influenced by linkages across firms through the labor market?
- What the sources of this impact or return predictability?
- What type of industries will be more likely to benefit from this effect?

1. Introduction

Research contents

- We construct a measure of industry connectedness that captures how closely two industries are linked in the labor market.
- We construct the Labor Connected Industry portfolio return (LCI return) and find a positive link between the return of an industry and the lagged return of its corresponding LCI portfolio. (robust tests)
- Our results suggest that the positive effect of labor productivity spill-over is the main reason of this phenomenon instead of negative spillover effect.
- In general, industries that have a greater capacity to absorb this positive shock benefit more.

1. Introduction



1.Introduction

Related researches

- Liu and Wu (2019) who emphasize that firms' competition for labor in segmented labor markets can make these markets conduits for transmission of shocks across firms.

(actual labor force vs. job postings; occupational characteristics vs. occupation titles)

- Kilic (2017) investigates the asset pricing implications of hiring demographics by linking firms' demographic adjustments to the level of technology. Zhang (2015) considers occupational composition of firms as a determinant of expected returns in cross section.
- Supply chain relationship between economic entities (Menzly and Ozbas (2010); Cohen and Frazzini (2008)), geographic proximity of firms' headquarters (Parsons, Sabbatucci, and Titman (2019)) make value relevant information to be impounded in the prices of fundamentally linked firms with a delay.

1.Introduction

Contribution

- Our paper contributes and bridges two strands of the literature.
  - First, it adds to the literature on labor and asset pricing.
  - Second, this paper extends the growing literature on lead-lag effects in returns of fundamentally connected firms.
- We construct a new labor connectedness measure based on firms' actual labor force and occupational characteristics.
- we find evidence of labor productivity spill-over for the positive predictive relationship among labor market connected industries, as opposed to a labor market competition channel.
- In particular, we directly test the economic channel and we show that labor market connections give rise to positive spillover of labor productivity shocks across industries.

2. Data & Variables

1) Stock Data

- Stock sample: common stocks (share code of 10 or 11) listed on NYSE, AMEX, and Nasdaq (exchange code of 1, 2 or 3).
- Resource: CRSP

2) Accounting Data

- Resource: Compustat Fundamentals Annual

2. Data & Variables

3) Labor Market Connectivity (I)

- The U.S. Department of Labor dataset of Occupational Information Network (O*NET) provides scores that reflect of relevance of each area of knowledge in each occupation.
  - O*NET provides information on the "importance" and "level" for each occupation.

$$S_{jk} = I_{jk}^{\frac{2}{3}} L_{jk}^{\frac{1}{3}}$$

- where $\mathrm{I}_{jk}$and L_{jk} denote, respectively, the "importance" and "level" quantities for each k and j available at O*NET

2. Data & Variables

3) Labor Market Connectivity (II)

- Bureau of Labor Statistics' Occupational Employment Statistics dataset provides information on the occupational composition of industries and their corresponding wages(NBER).
  - From 1988 to 1995 we combine surveys in each year with those in the previous two years to have a sample that covers all industries in each year.

$$c_{i,k,t} = \frac{\sum_j e_{i,j,t} \times s_{j,k}}{\sum_i e_{i,j,t}}$$

- where $e_{i,j,t}$ is the labor expenditure associated with occupation j in industry i in year t.

2. Data & Variables

3) Labor Market Connectivity (III)

- The final step in constructing the LC measure is to compare the composition of the areas of knowledge and their corresponding scores across industries.

$$\vec{C}_{i,t} = \left[c_{i,k,t}\right]_{1\times K}$$

- We calculate the logarithm of the inverse of the Euclidean distance.

$$LC_{i,i',t} = \log\left(\left\|\vec{C}_{i,t} - \vec{C}_{i',t}\right\|^{-1}\right) = -\frac{1}{2}\log\left(\sum_{k=1}^{K}\left(c_{i,k,t} - c_{i',k,t}\right)^2\right)$$

- where $LC_{i,i',t}$ is the labor market connectivity measure between industries i and i' in year t.

2. Data & Variables

3) Labor Market Connectivity (IV)

- Considering that the labor composition and wages are slow moving variables, we expect that the labor market connectivity between two industries do not change very rapidly from one year to another.

	1	2	3	4	5
1	86.86%	11.69%	1.18%	0.22%	0.04%
2	10.99%	72.23%	14.92%	1.59%	0.26%
3	1.74%	14.16%	69.14%	13.72%	1.25%
4	0.40%	1.77%	13.40%	72.11%	12.32%
5	0.10%	0.34%	1.34%	12.20%	86.02%

2. Data & Variables

3) Labor Market Connectivity (V)

- Our proposed labor market connectivity measure is constructed using the occupation-level labor expenditure as the weights when averaging the knowledge scores across all occupations in an industry.
  - $LC_{i,i',t}^{emp}$: the number of employees as the weight.
  - $IO_{i,i',t}$: input-output connectivity defined following Menzly (2010).
  - $Geo.Distance$: defined as the average of the pairwise distance (in miles) between the zip codes of the headquarters of the two firms.

	$LC_{i,i',t}$	$LC_{i,i',t}^{emp}$	$IO_{i,i',t}$	Geo. Distance
$LC_{i,i',t}$	1.000			
$LC_{i,i',t}^{emp}$	0.971	1.000		
$IO_{i,i',t}$	0.272	0.243	1.000	
Geo. Distance	0.022	0.023	-0.001	1.000

3. Empirical results

Labor Market Connectivity & Return Predictability

- In brief, there are two counter economic forces can shape the effect of labor market network on asset prices and real quantities

1) The negative spill-over effect

- A negative idiosyncratic demand shock to an industry, for instance, can shift the supply of labor upward in specific segments of the market and reduce labor market tightness for labor with a specific skill set.

2) The positive spill-over effect

- Industries with overlapping labor types could benefit from labor-productivity enhancing shocks to their connected industries, thus generating a positive spill-over effect

3. Empirical results

1) Portfolio Sorts (I)

- To determine whether the returns of the labor market connected industries ($LCIRet_{i,t}$) predict future returns of a subject industry, we sort industries into quintile portfolios at the end of each month based on the value of their $LCIRet_{i,t}$, and compute the average return of each quintile portfolio over the next month.

$$LCIRet_{i,t} = \frac{\sum_{i' \neq i} LC_{i,i',t-1} \times r_{i',t-1}}{\sum_{i' \neq i} LC_{i,i',t-1}}$$

- where $r_{i',t-1}$ is the market cap-weighted (or equally weighted) average return of firms in industry i' in month t.

3. Empirical results

1) Portfolio Sorts (I)

we observe a positive relation between the returns of an industry's labor connected industry portfolio and its return in the next month. This relationship is monotonic and economically significant

Panel B. Equal-Weighted Returns

Low	2	3	4	High	Hi-Lo
6.82	9.83	11.93	12.82	16.06	9.23
20.59	19.41	17.90	18.83	19.26	8.97
-0.16	0.03	-0.32	-0.23	-0.05	-0.28
6.03	6.85	5.31	6.58	6.71	5.52
0.33	0.51	0.67	0.68	0.83	1.03

Panel A. Value-Weighted Returns

	Low	2	3	4	High	Hi-Lo
Mean	6.58	8.68	9.32	10.73	11.76	5.19
Std	17.70	17.21	16.16	16.12	16.97	8.77
Skew	-0.52	-0.49	-0.60	-0.63	-0.54	-0.16
Kurt	5.26	5.37	5.91	5.73	5.90	3.91
Sharpe	0.37	0.50	0.58	0.67	0.69	0.59

3. Empirical results

1) Portfolio Sorts (II)

- Importantly, the spillover of economic shocks through the labor market network can influence firm's policies, which in turn can lead to variations in firm characteristics that are established in the literature to predict equity returns in the cross section.
- It is crucial to examine how this variable ($LCIRet_{i,t}$) relates to such firm characteristics.

Quintile	BM	Size	$\text{Ret}_{i,t-12:t-2}$	Op. Lev.	Profitability	Innovation	Investment	Hiring
Low	0.661	2.628	0.167	1.086	0.332	0.159	0.309	0.048
2	0.702	2.522	0.162	1.161	0.355	0.151	0.304	0.041
3	0.693	2.682	0.154	1.133	0.359	0.149	0.297	0.040
4	0.688	2.582	0.154	1.168	0.356	0.156	0.309	0.042
High	0.657	2.613	0.175	1.081	0.328	0.159	0.315	0.047
Hi-Lo	-0.004	-0.149	0.008	-0.005	-0.003	0.000	0.007	-0.001
t-ratio	(-0.19)	(-0.22)	(1.49)	(-0.59)	(-1.24)	(-0.22)	(2.67)	(-0.62)

3. Empirical results

1) Portfolio Sorts (III)

- Next, we estimate the abnormal of returns of each quintile portfolio with respect to a number of factor models.

	Panel A. Value-Weighted Returns						Panel B. Equal-Weighted Returns					
	Low	2	3	4	High	High-Low	Low	2	3	4	High	High-Low
CAPM	-2.25	-0.06	1.05	2.47	3.23	5.48	-2.58	1.01	3.67	4.29	7.29	9.86
	(-1.38)	(-0.04)	(0.79)	(1.86)	(2.13)	(3.15)	(-1.08)	(0.44)	(1.80)	(1.93)	(3.24)	(5.58)
FF3	-3.87	-1.62	-0.58	1.03	1.66	5.53	-4.62	-1.07	1.48	2.16	4.95	9.57
	(-2.76)	(-1.32)	(-0.54)	(0.95)	(1.32)	(3.15)	(-2.49)	(-0.64)	(1.04)	(1.38)	(3.32)	(5.37)
FFC4	-2.86	-0.46	0.35	1.53	2.01	4.86	-2.00	1.31	3.65	4.38	6.80	8.81
	(-2.07)	(-0.38)	(0.34)	(1.41)	(1.58)	(2.74)	(-1.20)	(0.87)	(2.91)	(3.10)	(4.92)	(4.92)
FF5	-5.66	-3.39	-2.73	-0.89	-0.28	5.38	-3.96	-1.36	1.07	2.34	4.81	8.77
	(-4.13)	(-2.85)	(-2.83)	(-0.85)	(-0.23)	(2.94)	(-2.06)	(-0.79)	(0.72)	(1.44)	(3.09)	(4.77)
HXZ4	-4.85	-1.87	-1.16	-0.06	0.34	5.18	-1.49	1.03	3.70	4.82	7.23	8.72
	(-3.10)	(-1.37)	(-0.93)	(-0.05)	(0.25)	(2.77)	(-0.76)	(0.56)	(2.39)	(2.90)	(4.56)	(4.62)
SY4	-3.02	-0.80	-0.59	0.29	0.50	3.53	-0.18	2.50	4.96	5.56	7.12	7.31
	(-1.87)	(-0.55)	(-0.46)	(0.23)	(0.34)	(1.85)	(-0.09)	(1.38)	(3.13)	(3.16)	(4.04)	(3.82)
DHS3	-1.42	0.95	0.93	2.31	2.51	3.93	2.74	4.65	7.17	8.36	9.86	7.13
	(-0.83)	(0.63)	(0.69)	(1.64)	(1.56)	(2.11)	(1.11)	(1.94)	(3.35)	(3.59)	(4.10)	(3.85)
FFCPS7	-4.89	-2.66	-2.18	-0.69	-0.14	4.75	-2.23	0.14	2.47	3.64	5.96	8.20
	(-3.67)	(-2.41)	(-2.46)	(-0.69)	(-0.11)	(2.58)	(-1.29)	(0.09)	(1.94)	(2.51)	(4.19)	(4.43)

3. Empirical results

1) Portfolio Sorts (IV)

- In the same vein, we investigate if the results are explained by the portfolio exposures to various macroeconomic shocks in a generalized method of moments (GMM) framework using a two-factor model.

$$M_t = 1 - b_M \times MKT_t - b_F \times F_t$$

- where MKT_t is the market factor and F_t is a proxy for the second aggregate shock using the first difference (Δ) in one of the following aggregate variables in year t.
  - $STDHN$: the cross-sectional standard deviation of firm level hiring rate
  - $iSHOCK$: investment specific shocks.
  - LMT: aggregate labor market tightness
  - $SPPEN$:sales of property, plant and equipment
  - AQC: mergers and acquisitions
  - $SPPEAQC$: the sum of sales of property, plant and equipment and mergers and acquisitions

3. Empirical results

1) Portfolio Sorts (IV)

$$E[r_{i,t}^e] = \alpha_i + b_M Cov(MKT_t, r_{i,t}^e) + b_F Cov(F_t, r_{i,t}^e)$$

where $r_{i,t}^e$ is the excess return on test asset i in year t, α_i is the pricing error, b_M and b_F are the loadings.

	(1) $\Delta STDHN$	(2) $iSHOCK$	(3) ΔLMT	(4) $\Delta SPPE$	(5) ΔAQC	(6) $\Delta SPPEAQC$
Low-LCIRet	-0.039	0.016	-0.043	-0.052	-0.035	-0.038
	(-1.09)	(0.32)	(-1.25)	(-2.03)	(-1.11)	(-1.37)
2	-0.020	0.058	-0.028	-0.030	-0.019	-0.022
	(-1.07)	(1.44)	(-1.56)	(-1.69)	(-1.23)	(-1.57)
3	-0.010	0.022	-0.013	-0.021	-0.009	-0.011
	(-0.4)	(0.68)	(-0.54)	(-1.46)	(-0.44)	(-0.58)
4	0.012	0.058	0.005	-0.002	0.009	0.007
	(0.58)	(1.81)	(0.27)	(-0.17)	(0.6)	(0.52)
High-LCIRet	0.020	0.103	0.005	0.001	0.012	0.010
	(0.98)	(3.71)	(0.3)	(0.11)	(0.83)	(0.76)
High-Low	0.059	0.087	0.048	0.053	0.047	0.048
	(3.25)	(2.02)	(2.22)	(2.50)	(2.11)	(2.42)
J-Statistics	25.446	16.839	25.090	14.293	17.994	19.509

3. Empirical results

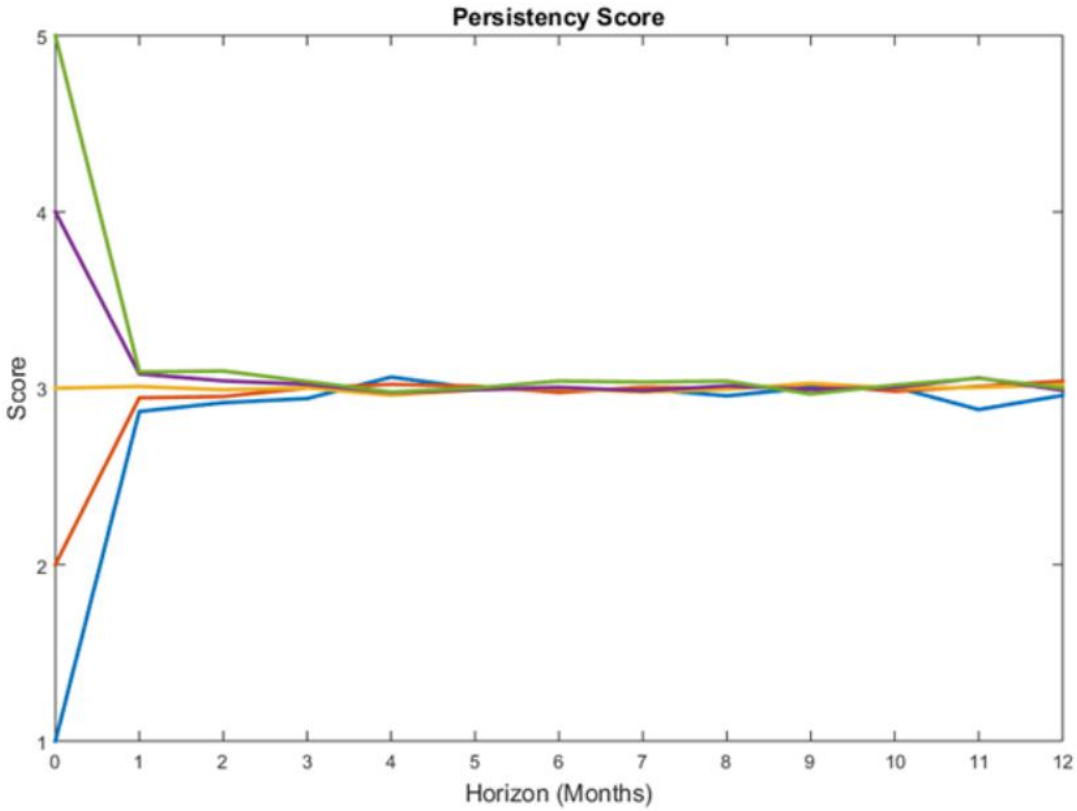
1) Portfolio Sorts (V)

- The above observations are helpful in addressing the potential concern that the observed return spread is driven by variations in industry exposures to the risk factors.
- A possible alternative explanation for the observed return spread is based on the industry characteristics that are correlated with the exposures to unobserved risk factors.
- Therefore we show the transition of industries across $LCIRet_{i,t}$ quintiles over various horizons.
  - Specifically, at the beginning of each month we give a score to each industry based on the quintile that it belongs to (5 for the highest quintile, 1 for the lowest quintile).
  - We then keep track of these scores for the same industries over time and measure the average value of those scores for industries that initially belonged to each quintile.

3. Empirical results

1) Portfolio Sorts (V)

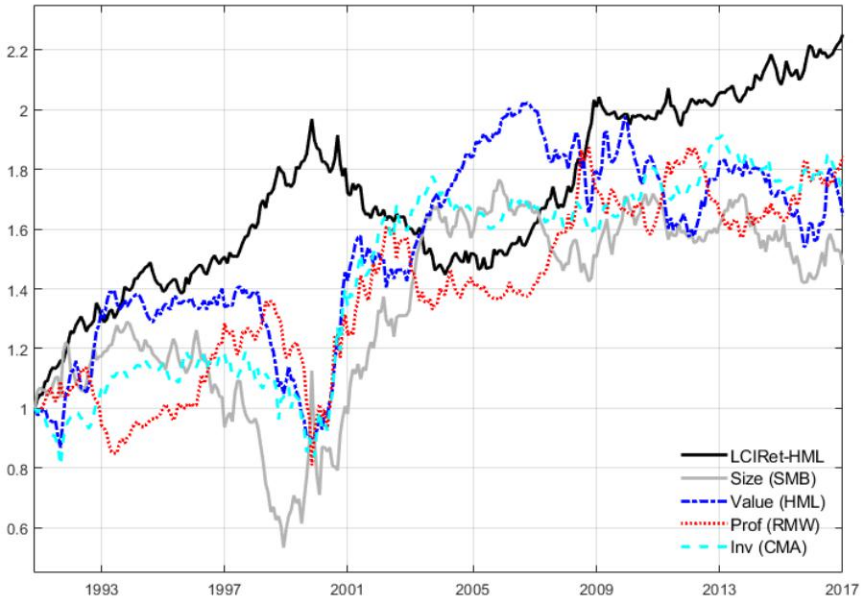
Figure suggests that industries transition from each quintile to any other quintile with almost the same probability.
This would rule out $LCIRet_{i,t}$ being driven by a persistent industry characteristic.



3. Empirical results

2) Persistence of the Returns Over Time

- The results of portfolio sorts indicate that the returns of an industry are crucially determined by the past returns of its labor connected industries. We now evaluate whether this relation persists over time.



3. Empirical results

3) Fama-MacBeth Regressions

$$Ret_{i,t} = \beta_t^0 + \beta_t^1 \cdot LCIRet_{i,t} + \sum_{k=1}^{K} \beta_t^j \cdot X_{i,t-1}^k + \epsilon_{i,t}$$

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$LCIRet_{i,t-1}$	0.366	0.372	0.300	0.297	0.288	0.271	0.433	0.416
	(3.437)	(3.561)	(2.862)	(2.936)	(2.694)	(2.524)	(3.137)	(3.065)
$Ret_{i,t-1}$		0.004	-0.007	-0.010	-0.007	-0.007	-0.004	-0.003
		(0.446)	(-0.716)	(-1.055)	(-0.694)	(-0.701)	(-0.404)	(-0.286)
$RetSIC2_{i,t-1}$			0.033	0.031	0.015	0.017	0.016	0.017
			(3.114)	(3.048)	(1.191)	(1.299)	(1.205)	(1.252)
$Ret_{i,t-12:t-2}$				0.008	0.008	0.008	0.009	0.008
				(2.265)	(2.198)	(2.371)	(2.366)	(2.369)
$IORet_{i,t-1}$					0.085	0.074	0.079	0.086
					(2.363)	(2.043)	(2.128)	(2.333)
$RetSIC2_{i,t-12:t-2}$						-0.002	-0.002	-0.002
						(-0.548)	(-0.588)	(-0.568)
$LCIRet_{i,t-12:t-2}$							0.007	-0.002
							(0.186)	(-0.046)
NumAnal								0.000
								(0.683)
InstOwn								0.001
								(0.308)

3. Empirical results

4) Informed Trading

- Hong and Stein (1999) propose a theoretical model in which gradual diffusion of private information among investors explains the observed predictability of stock returns.
- The main hypothesis of this paper attributes the cross-industry return predictability to the spillover of labor productivity enhancing shocks along labor force linkages and the slow information diffusion of the shocks
- Hence, a natural prediction is that cross-industry return predictability should be negatively related to the level of information that is available in the market.

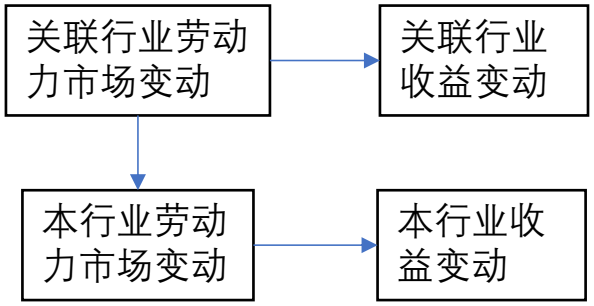
3. Empirical results

4) Informed Trading

Dependent Variable: $\text{Ret}_{i,t}$									
	A. Analyst Coverage			B. Institutional Holdings			C. Idiosyncratic Volatility		
	High	Low	High-Low	High	Low	High-Low	High	Low	High-Low
$\text{LCIRet}_{i,t-1}$	0.057	0.658	-0.601	0.252	0.625	-0.373	0.548	0.101	0.447
	(0.402)	(3.749)	(-2.846)	(1.848)	(3.916)	(-1.969)	(3.511)	(0.661)	(2.282)
$\text{Ret}_{i,t-1}$	-0.005	-0.004	-0.001	-0.001	-0.006	0.005	-0.015	-0.009	-0.006
	(-0.392)	(-0.338)	(-0.089)	(-0.084)	(-0.499)	(0.346)	(-1.162)	(-0.776)	(-0.361)
$\text{RetSIC2}_{i,t-1}$	-0.006	0.015	-0.021	0.004	0.011	-0.007	0.029	0.002	0.027
	(-0.339)	(0.820)	(-0.830)	(0.247)	(0.636)	(-0.296)	(1.661)	(0.149)	(1.185)
$\text{Ret}_{i,t-12:t-2}$	0.010	0.008	0.002	0.008	0.007	0.000	0.011	0.005	0.005
	(2.135)	(1.892)	(0.490)	(1.774)	(1.707)	(0.062)	(2.751)	(1.271)	(1.248)
$\text{IORet}_{i,t-1}$	0.058	0.088	-0.029	0.039	0.109	-0.070	0.054	0.060	-0.006
	(1.245)	(1.727)	(-0.438)	(0.865)	(2.204)	(-1.185)	(0.970)	(1.399)	(-0.093)

This result lends support to our prediction that the cross-predictability is stronger for stocks that are costlier to arbitrage and hence arbitrage risk also contributes to the lagged response.

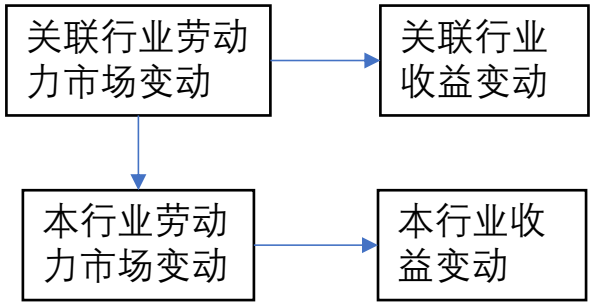
3. Empirical results



The Economic Channel

- The reported results confirm that the returns of labor market connected industries have an economically and statistically significant predictive power for an industry's future equity returns.
- This predictive power is not explained by the input-output linkages or overlapping product market across industries.
- In this section, we investigate the underlying channel through which these labor market linkages can induce a positive cross-sectional correlation between stock returns.

3. Empirical results



1) Spillover Effects in Fundamentals (I)

- positive spillover channel vs. negative spillover channel
- Is there a positive spillover of labor productivity across industries that are linked through the labor market?

$$\Delta V_{i,y} = \beta_0 + \beta_1 \cdot LCIRet_{i,y-1} + \beta_2 \cdot \Delta V_{i,y-1} + \beta_3 \cdot C_{i,y-1} + \lambda_y + \epsilon_{i,y}$$

$$\Delta V_{i,y} = \beta_0 + \beta_1 \cdot LCI\_V_{i,y-1} + \beta_2 \cdot \Delta V_{i,y-1} + \beta_3 \cdot C_{i,y-1} + \lambda_y + \epsilon_{i,y}$$

- where $V_{i,y}$ is one of the labor-related variables :
  - $Wage_{i,y}$: employment-weighted average of the hourly wages
  - $LaborExp_{i,y}$: total labor costs for industry
  - $Empl_{i,y}$: total employment in industry

$$LCI\_V_{i,y} = \frac{\sum_{i' \neq i} LC_{i,i',y-1} \times \Delta V_{i',y}}{\sum_{i' \neq i} LC_{i,i',y-1}}$$

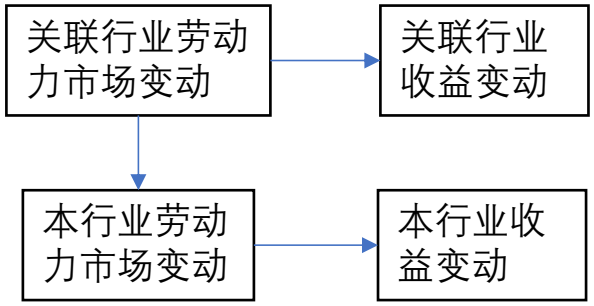
3. Empirical results

1) Spillover Effects in Fundamentals (I)

	A. $\Delta V_{i,y} = \Delta Wage_{i,y}$				B. $\Delta V_{i,y} = \Delta LaborExp_{i,y}$				C. $\Delta V_{i,y} = \Delta Empl_{i,y}$			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
$\text{LCIRet}_{i,y-1}$	0.106	0.122			0.550	0.502			0.611	0.536		
	(2.890)	(3.213)			(7.289)	(6.427)			(8.669)	(7.307)		
$\text{LCI-}V_{i,y-1}$			0.840	0.848			0.394	0.402			0.164	0.182
			(4.222)	(4.250)			(6.652)	(6.805)			(3.505)	(3.892)
$\Delta V_{i,y-1}$	-0.241	-0.241	-0.256	-0.256	0.001	0.001	-0.026	-0.029	0.026	0.027	0.019	0.018
	(-13.385)	(-13.373)	(-13.953)	(-13.951)	(0.061)	(0.053)	(-1.301)	(-1.450)	(1.718)	(1.806)	(1.231)	(1.154)
$\text{Ret}_{i,y-1}$	0.011	0.015	0.013	0.014	0.031	0.021	0.040	0.020	0.024	0.014	0.042	0.021
	(3.231)	(3.211)	(3.817)	(3.106)	(4.355)	(2.248)	(5.638)	(2.171)	(3.751)	(1.769)	(6.705)	(2.505)
$\text{RetSIC2}_{i,y-1}$		-0.006		-0.001		0.019		0.033		0.015		0.037
		(-0.986)		(-0.179)		(1.537)		(2.780)		(1.399)		(3.449)
$\text{IORet}_{i,y-1}$		-0.022		-0.017		0.059		0.110		0.126		0.123
		(-1.140)		(-0.897)		(1.492)		(2.819)		(3.793)		(3.556)

Models (1) and (2) in each panel of the table suggest that $LCIRet_{i,y-1}$ and labor-related variables all have a strong predictability in the future growth rate of wage, labor expenditure, and employment of the focal industry.

3. Empirical results



1) Spillover Effects in Fundamentals (II)

- While wage and labor expenditure growths are positively associated with changes in the labor productivity, those are not direct measure of it. We, therefore, come up with empirical proxies that provide more accurate characterization of the labor productivity in each industry.

$$\Delta LP_{i,y} = \beta_0 + \beta_1 \cdot LCIRet_{i,y-1} + \beta_2 \cdot \Delta LP_{i,y-1} + \beta_3 \cdot C_{i,y-1} + \lambda_y + \epsilon_{i,y}$$

$$\Delta LP_{i,y} = \beta_0 + \beta_1 \cdot LCI\_LP_{i,y-1} + \beta_2 \cdot \Delta LP_{i,y-1} + \beta_3 \cdot C_{i,y-1} + \lambda_y + \epsilon_{i,y}$$

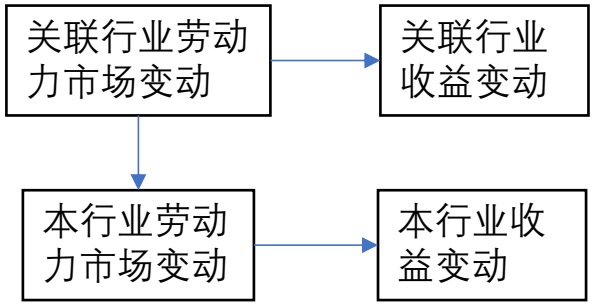
$$LCI\_LP_{i,y} = \frac{\sum_{i' \neq i} LC_{i,i',y-1} \times \Delta LP_{i',y}}{\sum_{i' \neq i} LC_{i,i',y-1}}$$

3. Empirical results

1) Spillover Effects in Fundamentals (II)

	A. Dependent Variable: $\Delta LP_{i,y}$ ΔSales per Employment				B. Dependent Variable: $\Delta LP_{i,y}$ ΔOutput per hour of labor			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
$\text{LCIRet}_{i,y-1}$	0.217	0.214			0.146	0.156		
	(2.589)	(2.458)			(1.990)	(2.042)		
$\text{LCI-LP}_{i,y-1}$			0.663	0.632			0.539	0.523
			(4.567)	(4.319)			(2.182)	(2.112)
$\Delta LP_{i,y-1}$	-0.026	-0.026	-0.028	-0.028	0.280	0.282	0.277	0.279
	(-1.723)	(-1.737)	(-1.811)	(-1.814)	(15.340)	(15.417)	(15.145)	(15.217)
$\text{Ret}_{i,y-1}$	0.036	0.044	0.038	0.042	0.017	0.022	0.018	0.022
	(4.768)	(4.502)	(5.029)	(4.331)	(3.030)	(3.371)	(3.231)	(3.286)
$\text{RetSIC2}_{i,y-1}$		-0.020		-0.013		-0.017		-0.014
		(-1.508)		(-1.011)		(-1.803)		(-1.447)
$\text{IORet}_{i,y-1}$		0.085		0.080		0.049		0.055
		(2.059)		(1.950)		(1.620)		(1.818)

3. Empirical results



1) Spillover Effects in Fundamentals (III)

- Lastly, we examine the relationship between the profitability of labor market connected industries by running the following panel regressions.

$$\Delta Prof_{i,y} = \beta_0 + \beta_1 \cdot LCIRet_{i,y-1} + \beta_2 \cdot \Delta Prof_{i,y-1} + \beta_3 \cdot C_{i,y-1} + \lambda_y + \epsilon_{i,y}$$

$$\Delta Prof_{i,y} = \beta_0 + \beta_1 \cdot LCI\_Prof_{i,y-1} + \beta_2 \cdot \Delta Prof_{i,y-1} + \beta_3 \cdot C_{i,y-1} + \lambda_y + \epsilon_{i,y}$$

$$LCI\_Prof_{i,y} = \frac{\sum_{i' \neq i} LC_{i,i',y-1} \times \Delta Prof_{i',y}}{\sum_{i' \neq i} LC_{i,i',y-1}}$$

- where $\Delta Prof_{i,y}$ is percentage change in the profitability of industry.

3. Empirical results

1) Spillover Effects in Fundamentals (III)

	Dependent Variable: $\Delta Prof_{i,y}$			
	(1)	(2)	(3)	(4)
$\text{LCIRet}_{i,y-1}$	0.630	0.518		
	(2.791)	(2.196)		
$\text{LCI-Prof}_{i,y-1}$			0.067	0.065
			(2.108)	(2.055)
$\Delta Prof_{i,y-1}$	-0.034	-0.034	-0.067	-0.066
	(-1.329)	(-1.330)	(-3.924)	(-3.891)
$\text{Ret}_{i,y-1}$	0.114	0.130	0.089	0.108
	(5.725)	(4.834)	(6.197)	(6.147)
$\text{RetSIC2}_{i,y-1}$		-0.047		-0.058
		(-1.346)		(-2.395)
$\text{IORet}_{i,y-1}$		0.370		0.230
		(3.417)		(2.969)

3. Empirical results

2) Adoption Capacity

- An important question is whether we observe a more pronounced effect when an industry is better equipped to take advantage of the productivity shock in its linked.
- Our hypothesis suggests that if a firm has the required resources to enhance its labor productivity, we should observe a greater price reaction to labor productivity shocks from its labor market connected industries

3. Empirical results

2) Adoption Capacity

Dependent Variable: $Ret_{i,t}$									
	A. Innovation			B. Profitability			C. Labor Mobility		
	High	Low	High-Low	High	Low	High-Low	High	Low	High-Low
$LCIRet_{i,t-1}$	0.720	0.315	0.405	0.523	0.063	0.460	0.623	0.116	0.507
	(2.789)	(2.012)	(1.92)	(3.196)	(0.434)	(2.429)	(2.65)	(0.658)	(2.162)
$Ret_{i,t-1}$	0.009	-0.004	0.012	-0.016	0.013	-0.029	0.000	0.004	-0.004
	(0.646)	(-0.248)	(0.703)	(-1.249)	(0.959)	(-1.754)	(0.026)	(0.252)	(-0.197)
$RetSIC2_{i,t-1}$	0.017	0.027	-0.010	0.031	0.007	0.024	0.002	0.022	-0.020
	(0.985)	(1.331)	(-0.418)	(1.763)	(0.394)	(1.004)	(0.086)	(1.139)	(-0.743)
$Ret_{i,t-12:t-2}$	0.008	0.010	-0.003	0.009	0.010	-0.001	0.013	0.004	0.010
	(1.706)	(1.951)	(-0.579)	(2.025)	(2.358)	(-0.309)	(3.116)	(0.835)	(2.128)
$IORet_{i,t-1}$	0.086	0.029	0.057	0.026	0.106	-0.080	0.044	0.059	-0.015
	(1.769)	(0.433)	(0.815)	(0.518)	(2.057)	(-1.26)	(0.622)	(1.012)	(-0.184)

Overall, these results suggest that a firm's capacity to benefit from labor productivity enhancing shocks is an important determinant of the predictive power of the lagged returns of the labor market connected industries.

4. Conclusion

- This paper introduces a novel measure of labor network that captures how closely two industries are connected in the labor market.
- We find that industries whose LCI past returns are in the top quintile outperform those in the bottom quintile. This return spread is not explained by established empirical asset pricing models.
- Furthermore, the return predictability is concentrated in stocks with lower presence of informed investors
- We understand the impact of labor market networks on real quantities and the economic sources of the return spill-over.
- Altogether, these findings suggest that the return predictability is due to the transmission of labor productivity shocks through the labor market network.