Worker Mobility and Domestic Production Networks

Marvin Cardoza,[1] Francesco Grigoli,[2] Nicola Pierri,[2] Cian Ruane[2]

[1]Directorate General of Internal Taxes of the Dominican Republic

[2]International Monetary Fund

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Motivation & Question

Factors affecting worker mobility across firms important policy & research topic

- Implications for worker earnings, reallocation dynamics, spillovers

Growing evidence from firm-to-firm trade data on role of production networks

- Propagation of shocks, firm performance, spillovers

This paper: how is worker mobility related to the production network?

- What are the implications for firms and workers?

Main Findings

VAT and employer-employee data for the Dominican Republic (2012–2017):

- Workers for whom firm makes social security contributions, 36% of labor force
- All transactions between formal firms (with > 1 permanent employee)

19% workers who change job move to buyers or suppliers of original employer

- Higher than random matching: up to 12%
- Common across industries, worker types and firm types
- Higher frequency for high-salary workers: 32% in top quintile

Associated with $\downarrow$ job separation and persistent $\uparrow$ worker earnings

- Relative to similar workers moving to the same firm

Associated with persistent $\uparrow$ firm size and $\uparrow$ coworker earnings

- Relative to similar firms which are hiring, but not from buyers or suppliers

Mechanisms & Implications

Examine two potential (not mutually exclusive) explanations:

- Lower information frictions for buyers and suppliers
- Supply-chain specific human capital: insourcing or complementarities

After workers move from a supplier to a buyer, buyer purchase shares *increase*!

- Points away from insourcing and towards complementarities

Measurable social network of *ex-coworkers* does not explain our findings

- Workers still disproportionately move to buyers or suppliers

Findings have implications for many policy-relevant issues:

- Production network amplifies impact of shocks on labor market
- No-poaching agreements between buyers and suppliers harmful

Literature

Determinants and impacts of worker mobility across firms:

- Stoyanov and Zubanov (2012), Schmutte (2014), Moscarini and Postel-Vinay (2017), Manning and Petrolongo (2017), Haltiwanger, Hyatt, Kahn and McEntarfer (2018), Nimczik (2018), Sorkin (2018), Cestone, Fumagalli, Kramarz and Pica (2019), Huneeus, Huneeus, Larrain, Larrain and Prem (2018),

Worker mobility and referrals / social networks:

- Topa (2011), Burks, Cowgill, Hoffman and Housman (2015), Brown, Setren and Topa (2016), Dustmann, Glitz, Schonberg and Brucker (2016), Glitz (2017), Eliason, Hensvik, Kramarz and Skans (2018), Caldwell and Harmon (2019)

Empirics of production networks and firm performance:

- Barrot and Sauvagnat (2016), Huneeus (2018), Bernard, Moxnes, Saito (2019), Bernard, Dhyne, Magerman, Manova, Moxnes (2019), Alfaro-Urena, Manelici and Vasquez (2020), Dhyne, Kikkawa, Mogstad, Tintelnot (2020)

Matched VAT + Employer-Employee data:

- Adao, Carillo, Costinot, Donaldson and Pomeranz (2020), Alfaro-Urena, Manelici and Vasquez (2020) Demir, Fieler, Xu and Yang (2020), Huneeus, Kroft, Lim and Price (2020), Patault and Lenoir (2020)

Outline

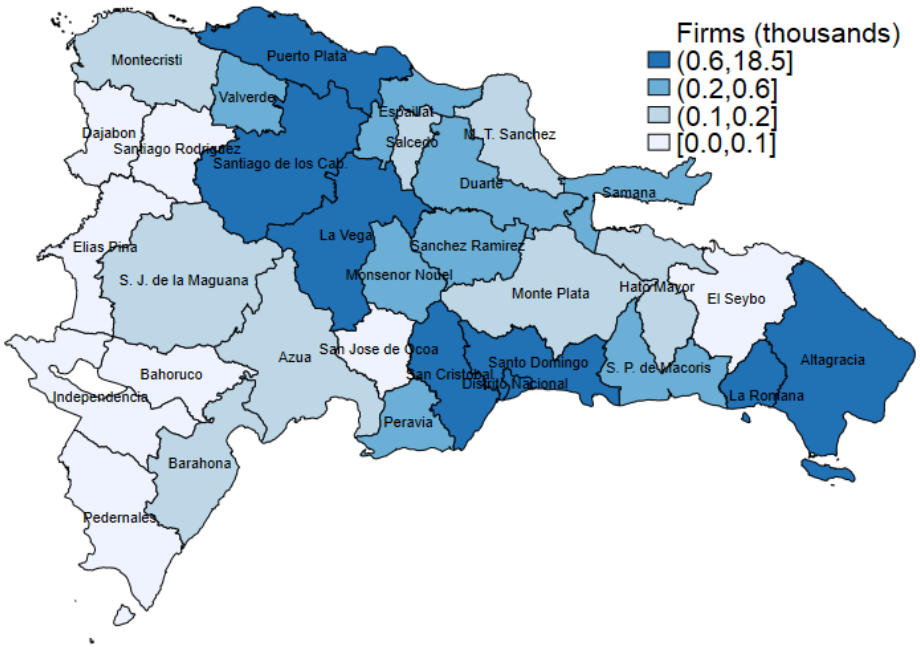
Data

Combine administrative datasets on firms and workers from 2012-2017

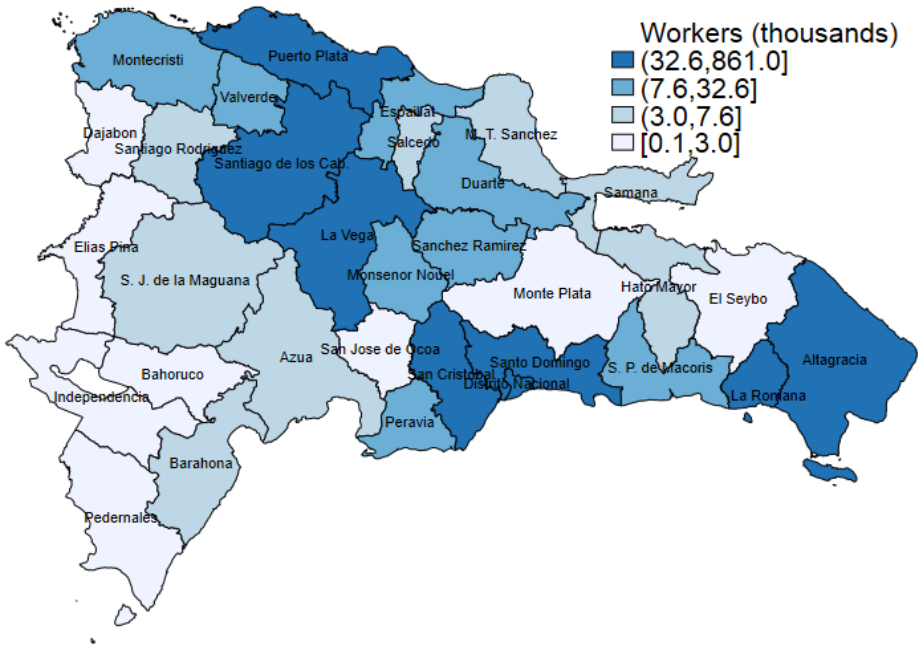
1. VAT data: firm-to-firm transactions for all firms in the formal sector
   - 1.6 mil transactions per year in almost 36k firms
2. Employer-employee data: all "permanent" workers at these firms
   - Workers for whom firm makes social security contributions
   - 1.6 million workers ($\approx$ 36% of labor force)
3. Other: firm balance-sheets and ownership, worker demographics, etc.

Limitations: yearly data, short panel, formal workers only

Setting



(a) Firms



(b) Workers

- Population $\approx$ 10 million, labor force $\approx$ 4.5 million
- GDP per capita $\approx$ US$7,000
- GDP growth averaged 5.3%, inflation 2.8%

Outline

Movers

Assign each worker to one employer per year (highest salary)

A mover = worker who's main employer changes between $t-1$ and t

- 10% of workers in a year make formal job-to-job transitions
- 766,000 moves between 2012 and 2017

New finding: 19.1% of movers get hired by firms which are buyers or suppliers (or both) of their employer at time $t-1$

- Moves to buyers and to suppliers equally important

Benchmark: 36% of movers stay in same 2-digit industry

Random assignment to job vacancies

Could 19.1% be the result of random matching of workers to job openings?

- Each mover corresponds to one job opening at a firm

Reshuffle all movers across job openings, conditional on:

- characteristics of the firm the worker moved to
- characteristics of the worker who filled the job opening

Firm Characteristics	Worker Characteristics	Share To Buyers/Suppliers
None	None	7.1%
Industry, Municipality	None	11.5%
Industry, Municipality	Age, Gender, Salary	12.4%

Firm-Pair Regressions

Pattern Across Industries

Share of Workers Moving to Buyers or Suppliers

	Construction	Hotels	Manufacturing	Transport	Wholesale & Retail
Construction	18.7	12.0	24.0	15.0	20.9
Hotels	19.9	24.5	18.1	15.4	24.5
Manufacturing	12.7	14.1	17.4	14.0	24.6
Transport	16.6	21.4	16.9	20.0	21.2
Wholesale & Retail	16.7	25.1	26.4	20.3	32.4

Tendency to move to buyers and suppliers present for all industries

- whether or not movers are changing industry

Worker Earnings

No heterogeneity across age, gender or racial groups

High-salary workers much more likely to move to buyers/suppliers

- As are workers with longer tenure at a firm (max = 4 years)

	Earnings Quintile				
	1^{st}	2^{nd}	3^{rd}	4^{th}	5^{th}
Data	11.8	14.8	19.7	27.5	32.8
Random allocation	7.9	8.8	11.5	17.3	19.1
Number of movers	133,698	184,311	154,619	101,969	80,334

Preliminary: more moves to buyers/suppliers for workers with more schooling

- Smaller sample of workers

Heterogeneity

	Data	Random Allocation	# Movers
Change municipality	15.6	10.2	257,606
Same municipality	22.6	13.4	345,733
Firms $<$ 500 workers	14.2	4.1	346,033
Mass Layoffs	20.3	9.7	69,999
No Business Groups	17.4	11.1	622,321
One Employer p/year	15.5	10.3	167,427

Ex-Coworker Networks

Social networks and referrals extremely important for job finding

- Only measure of social networks in our data = ex-coworkers

Focus on movers from 2016 to 2017, measure ex-coworkers from 2012-2015

- Ex-coworkers only defined if in firms with < 100 employees
- 16% of movers in 2016 go to a firm with an ex-coworker

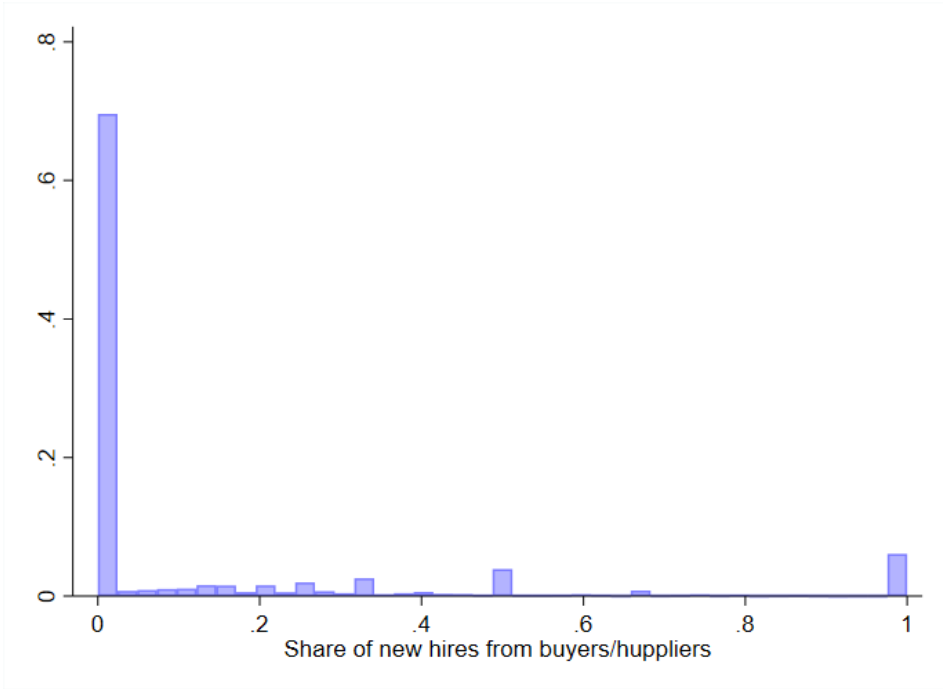
Share of Workers Moving to Buyers or Suppliers

	All	No Ex-Coworkers	Ex-Coworkers
Data	16.5	14.8	26.9
Random allocation	12.0	11.4	20.4
Number of movers	49,249	42,168	7,081

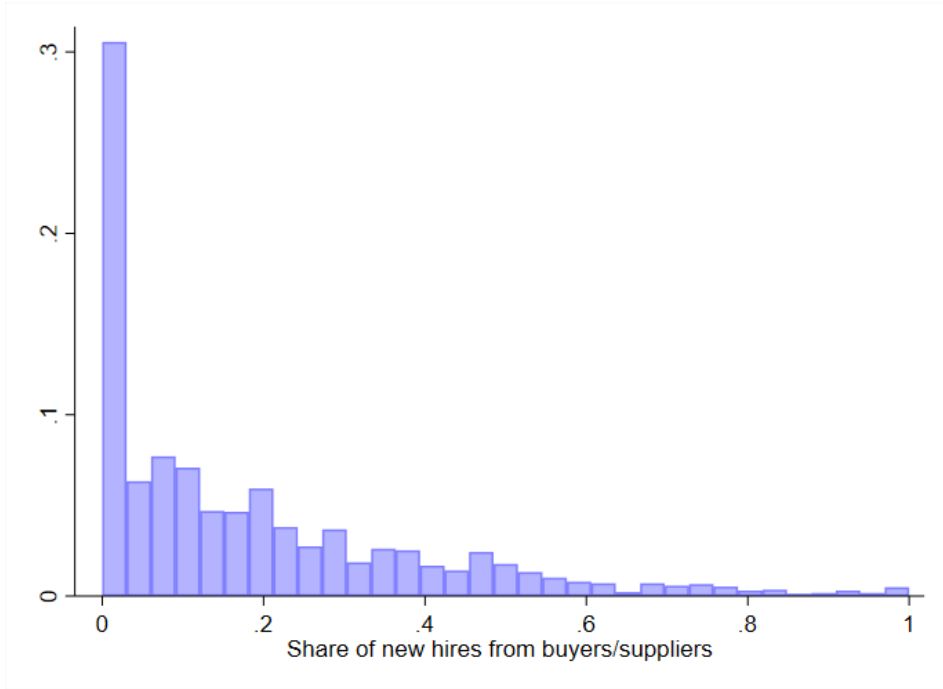
Heterogeneity Across Firms

Conditional on hiring, 30% of firms hire ≥ 1 worker from buyers/suppliers

(a) ≥ 1 Hire

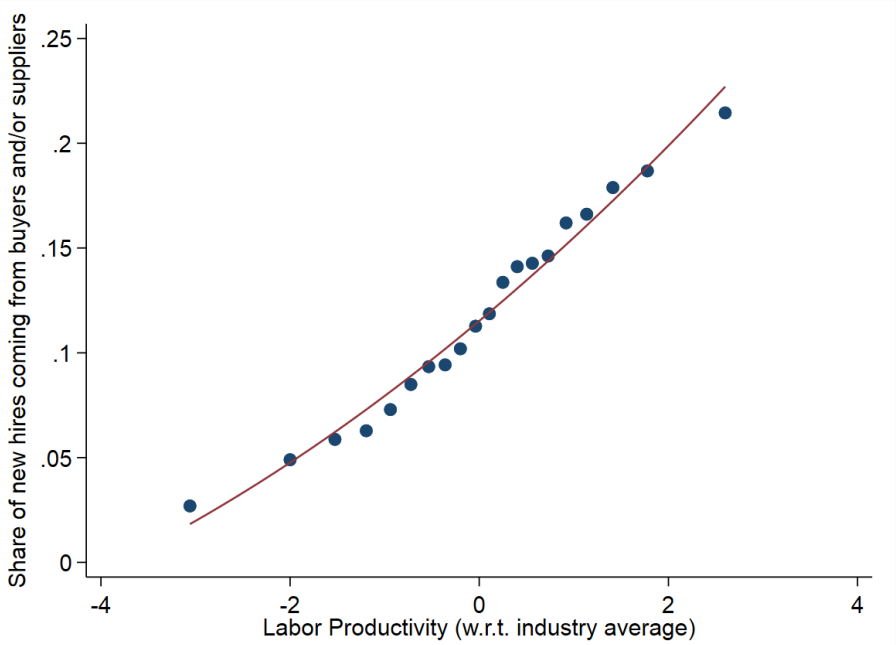


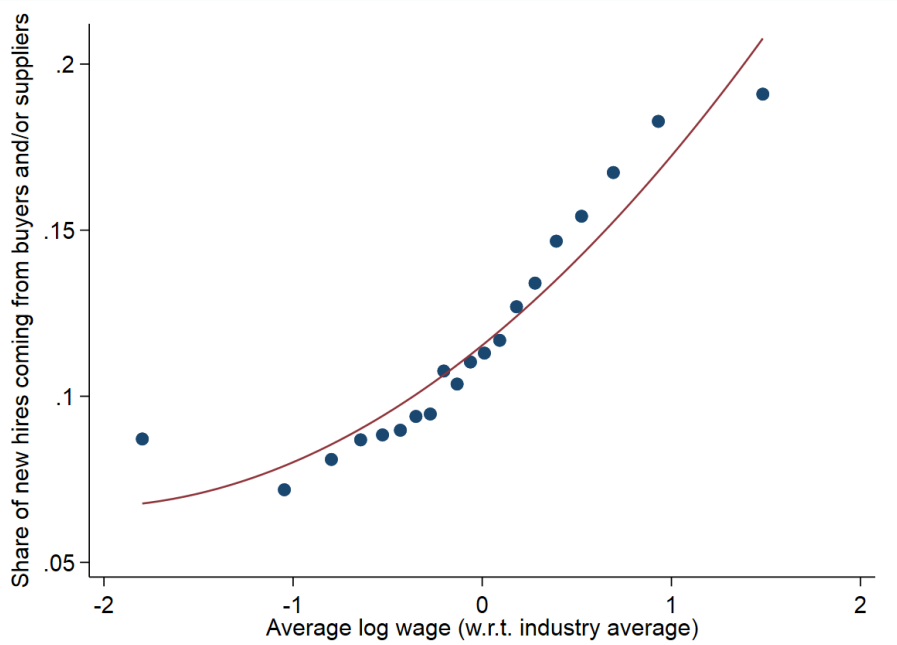
(b) ≥ 10 Hires



Autocorrelation of share of hires from buyers/suppliers = 0.24

More common among high productivity/wage firms





Not due to high productivity firms having more buyers/suppliers

IO structure and worker mobility at industry-level

Do firm-level patterns hold at industry-level?

$$ShLeavers_{n \to m,t} = \phi_m + \phi_n + \phi_t + ShTrade_{n,m,t-1} + \eta_{n,m,t}$$

Where for any two industries $m, n \neq m$:

- $ShTrade_{n,m,t-1}$ share of n's purchase from or sales to m
- $ShLeavers_{n \to m,t}$ share of movers from industry n going to m

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	All workers		Excluding movers to buyers/suppliers	
	(1)	(2)	(3)	(4)
Share of sales	0.126***		0.087***	
	(0.036)		(0.026)	
Share of purchases		0.166***		0.086**
		(0.044)		(0.036)
Observations	7,800	7,800	7,800	7,800
R^2	0.613	0.607	0.613	0.607

Outline

Match quality: duration

Unconditionally, matches are 4 months longer for moves from buyers and suppliers

- For workers who moved between 2012 and 2013

Compare similar movers, controlling for origin and destination firm FEs

- $D_{w,o,d}$ = duration in years, or dummy for match lasting until 2017
- $SB_{d,o,t-1}$ dummy for d being a supplier or buyer of o in $t-1$

$$D_{w,o,d} = \phi_d + \phi_o + \beta SB_{o,d,2012} + \gamma X_{o,d} + \delta X_w + \eta_{w,d,o}$$

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	Duration in years			Same firm in 2017		
	(1)	(2)	(3)	(4)	(5)	(6)
Supplier/buyer	0.310***	0.251***	0.097***	0.078***	0.065***	0.018***
	(0.017)	(0.017)	(0.010)	(0.005)	(0.005)	(0.005)
Worker controls		✓	✓		✓	✓
Origin and destination firm FEs			✓			✓
Firm pair controls			✓			✓
Observations	136,164	136,161	123,807	136,164	136,161	123,807
R^2	0.006	0.029	0.343	0.006	0.025	0.308

Match quality: earnings relative to pre-move year

$$wage_{w,o,d,t+k} = \phi_{d,k} + \phi_{o,k} + \rho_k wage_{w,o,d,t-1} + \beta_k SB_{o,d,t-1} + X_{w,o,d,t,k} + \eta_{w,o,d,t,k}$$

- w is a worker moving from firm o to firm d between $t-1$ and t
- Origin and destination firm FEs, worker and firm-pair characteristics

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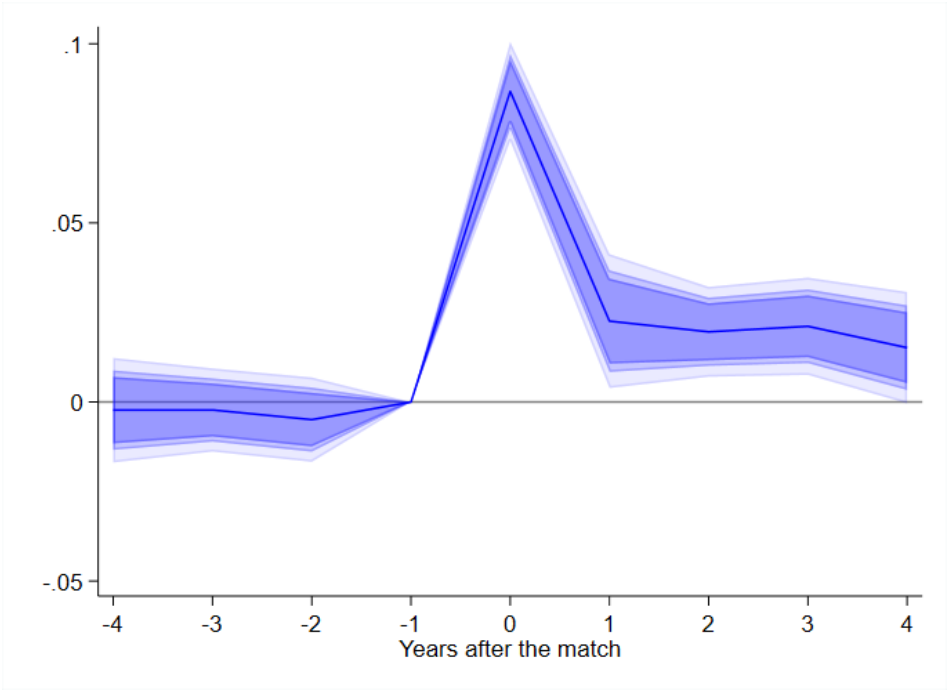


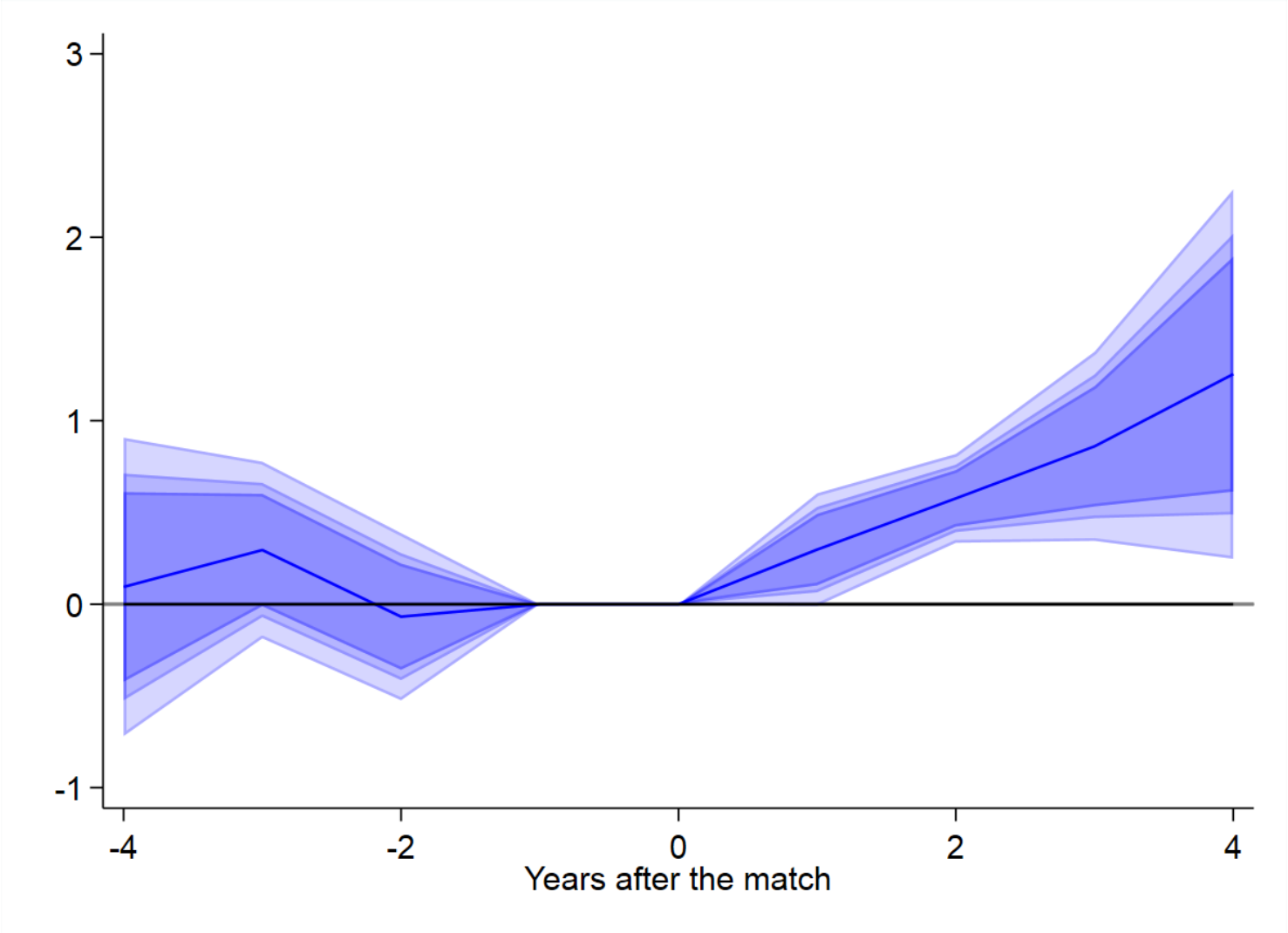
Firm Growth (Work in Progress)

Focus on all firms i who hired at least one worker between t and $t-1$

$$y_{i,t+k} = \rho_k y_{i,t} + \gamma_k H_{i,t} + \beta_k HSB_{i,t} + \delta_k X_{i,t-1} + \eta_{i,t,k}$$

- $y_{i,t+k}$ = log(sales)
- $H_{i,t}$ number of new hires (normalized by workforce at $t-1$)
- $HSB_{i,t}$ new hires coming from buyers/suppliers (normalized)
- $X_{i,t-1}$: industry, year, location, mean wage of new hires, and $y_{i,t-1}$
- Weight by # employees

Firm growth (Work in Progress)



Coworker learning

Do workers learn from new coworkers?

- Jarosch, Oberfield, and Rossi-Hansberg (forthcoming) say yes
- Workers earnings grow when they have more high-wage coworkers

We consider coworker earnings growth after hires from buyers/suppliers:

$$wage_{w,i,t+k} = \rho_k \cdot wage_{w,i,t} + \delta_k D_i^{nh} + \beta_k D_i^{nh*} + \gamma_k X_{w,i} + \epsilon_{w,i,t}$$

- D^{nh} dummy = 1 if firm i hired from any firm
- D^{nh*} dummy = 1 if firm i hired from a buyer or supplier
- Focus on firms <100 employees

Coworker learning: Results

	1 year	2 years	3 years
New hire	0.028***	0.055***	0.047***
	(0.003)	(0.004)	(0.005)
New hire from buyer or supplier	0.057***	0.061***	0.079***
	(0.005)	(0.006)	(0.007)
Observations	1,378,117	892,476	533,509
R^2	0.429	0.353	0.276

Higher earnings for coworkers who later leave the firm!

- Not solely rent-sharing

Outline

Two (non-mutually exclusive) explanations

Information frictions may be lower for buyers/suppliers

- Uncertainty about workers' fit with a vacancy
- Evidence that referrals $\rightarrow$ more likely to be hired and better match quality
- Workers may interact with buyers/suppliers $\rightarrow$ reduce information asymmetries
- Our findings hold including or excluding ex-coworkers

Human capital may be transferable along the supply chain. Suggestive evidence:

- long-lasting positive impact of hiring from buyers/suppliers
- high-wage workers more likely to move to buyers/suppliers
- industry-level: excluding buyers/suppliers workers still move upstream/downstream

Why might human capital of buyers and suppliers be different?

- Insourcing
- Complementarities

$\rightarrow$ **look at how purchase shares change after worker moves**

Insourcing and complementarities

We focus on all buyer-supplier (b,s) pairs in 2012 data and estimate:

$$TF_{s\to b,2017} = \phi_s + \phi_b + \beta WF_{s\to b} + \gamma X_{s,b} + \eta_{s,b}$$

- $TF_{s\to b,2017}$ measure of firm-to-firm trade in 2017
  - dummy for whether s still a supplier of b
  - change in share of b's purchases from s or share of s's sales to b

- $WF_{s\to b}$ dummy = a worker moved from supplier to buyer between 2012-17

No evidence of insourcing

Firms more likely to trade (or increase trade) following a worker move

	Any trade	Share of purchase		Share of sales	
	(1)	(2)	(3)	(4)	(5)
Worker flow	0.027***	0.123***	0.111***	0.134***	0.112***
	(0.003)	(0.014)	(0.014)	(0.014)	(0.0151)
Purchases >0 in 2017			✓		✓
Observations	976,727	976,727	458,165	976,727	458,165
R^2	0.344	0.265	0.389	0.246	0.376

Suggest role for complementarities rather than insourcing

Conclusion & Policy Implications

Main findings:

1. Workers tend to move to buyers and suppliers of previous employer
2. These matches are high-quality and benefit coworkers
3. Complementarities between human capital and inputs

Non-compete covenants / no-poaching agreement between firms

- Harmful when they constrain workers from moving horizontally
- Our findings imply restraining vertical moves is similarly bad

Empirical evidence that firm shocks propagate through production network

- Amplifies output and productivity losses
- But, propagation also worsens workers labor market options for workers

Backup Slides

Firm-pair level regression

Further test results:

$$WF_{o\to d,t} = \phi_d + \phi_o + \beta \cdot SB_{d,o,t-1} + \gamma X_{d,o,t} + \eta_{d,o,t}$$

- d and o are random firms
- $WF_{o\to d,t}$ dummy for worker moving from j to i
- $SB_{d,o,t-1}$ dummy for d and o trading at $t-1$
- $X_{d,o,t}$ set of firm-pair level controls: e.g. cross-product of firms industries and locations and size

Results:

- β positive and large $\Rightarrow$ worker flows are much more likely between buyers and suppliers
- Results not driven by assortative matching (e.g. closer firms trading together and also workers moving nearby)

Back