From a Way of Life to Ways of Earning a Living

The Impact of E-commerce on Occupational Choices

Wei Li, Yao Amber Li

Hong Kong University of Science and Technology

August 24, 2023

Introduction

Will the development of e-commerce render more people unemployed?

RETAILDIVE Deep Dive Opinion Podcasts Library Events

Technology Marketing DTC Operations Distressed Retail Store Concepts Trends

DIVE BRIEF

E-commerce could kill 30K stores and half a million jobs by 2025

Published Jan. 23, 2020

Ben Unglesbee
Senior Reporter

Phillip Pessar, Flickr

Introduction

- E-commerce has labor market implications.
- E-commerce is a disaster for some while a windfall for others.
  - It may undermine or even shut down traditional businesses
    - For example, small offline retailers suffer from the coming of e-commerce (Chava et al. 2023).
  - It boosts demand for some occupations.
    - Low-skilled jobs such as couriers
    - High-skilled positions such as programmers
  - It creates numerous employment opportunities in new sectors.
    - Information-based services and e-commerce training businesses.

Research question

- We still lack direct evidence on e-commerce's impact on the labor market structure
  - How does e-commerce relocate the workforce across sectors and occupations?
  - What are the resultant changes in wages and incomes?
- This paper uses Chinese data to identify the causal impact of e-commerce on labor market outcomes.

Context: why use Chinese data

- China has become the largest online market in the world.
  - China: 1,344 billion USD in 2020
  - The United States: 538 billion USD
  - Europe: 461 billion USD
  - The rest of the world: 513 billion USD
- There is significant heterogeneity in e-commerce adoption within China.
  - Inspire those with inchoate e-commerce economies
  - Inform those with matured online markets
- The institutional context in China allows me to leverage an Internet policy to instrument the e-commerce measurements.

Specification

$$y_{ipt} = \alpha_0 + \alpha_1 EC_{p,t-1} + \gamma_i + \delta_t + \varepsilon_{ipt}$$

- i, p, t indexes individual, province, and year, respectively.
- y_{ipt}: labor market outcome
- $EC_{p,t-1}$: the development of e-commerce
- γ_i: individual fixed effect
  - capture constant individual characteristics, e.g., innate intelligence.
- δ_t: time fixed effect
  - capture the macro time trends.
- Standard errors are clustered at the individual level.
- Endogenous concerns
  - Some confounding factors varying individual by year can affect occupational choices and the development of e-commerce simultaneously.

IV Approach: An Internet Policy in China

- *"Speed up and cheapen the Internet"* (henceforth, the SUCI policy)
- Context
  - An oligopoly telecommunications market in China: Three state-owned enterprises have dominated the industry since 2008 (Xia 2017).
  - Telecommunications prices were sticky, and the improvement of Internet services was incredibly slow.
- Implementation
  - **Time**: May 2015, issued by the central government.
  - **How**: The schedule and stringency to implement the policy are left to local governments' discretion.
  - **Consequence**: The country-average price of Internet services has decreased by more than 95% in 2021 compared to 2015.

The SUCI policy serves as a valid IV

- Exclusion
  - The SUCI policy gave an exogenous push to the oligopolies.
  - Exclusion violation via labor demand?
    - ⋆ The policy reduces the profit markup of telecommunications operators → No labor demand boost.
    - ⋆ State-owned enterprises have limited leeway to downsize.
  - Exclusion violation via Internet usage?
    - ⋆ Control for individual FE, capturing individual-specific channels.
    - ⋆ Add additional control variables to capture Internet development and individual Internet usage.
  - Suggestive evidence based on zero-first-stage test (Bound and Jaeger 2000)
- Relevance & monotonicity
  - Internet availability is a premise of the digital economy.
  - Better Internet services facilitate e-commerce adoption, given other advantages that online shopping provides.

IV Approach

First-stage Specification

$$EC_{p,t-1} = \beta_0 + \beta_1 P_{p,t-1} + \gamma_i^{'} + \delta_t^{'} + \varepsilon_{ipt}^{'}$$

- $P_{p,t-1}$: the stringency of the policy implementation.

Specification

$$y_{ipt} = \alpha_0 + \alpha_1 EC_{p,t-1} + \gamma_i + \delta_t + \varepsilon_{ipt}$$

- $EC_{p,t-1}$: the development of e-commerce ▸ E-commerce
- y_{ipt}: labor market outcomes ▸ Occupation and Income

$$EC_{p,t-1} = \beta_0 + \beta_1 P_{p,t-1} + \gamma_i^{'} + \delta_t^{'} + \varepsilon_{ipt}^{'}$$

- $P_{p,t-1}$: the stringency of the policy implementation. ▸ Policy

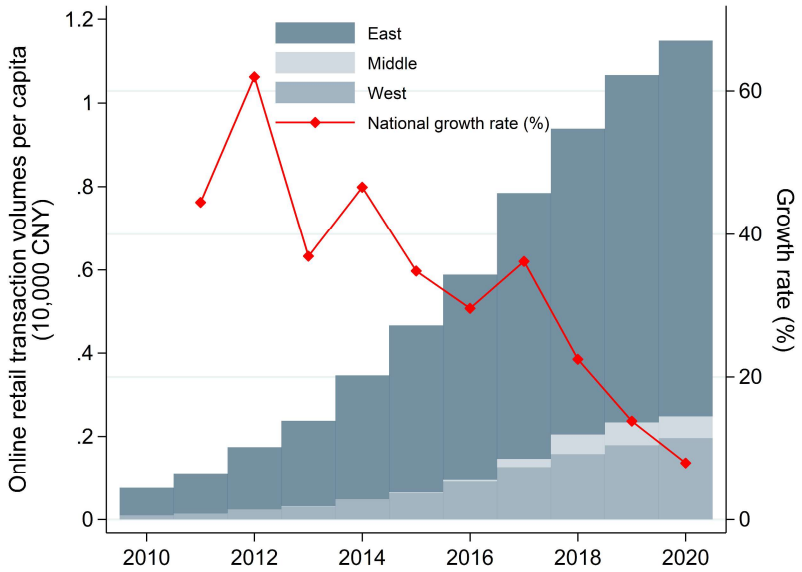
E-commerce (emphasize on the B2C and C2C businesses)

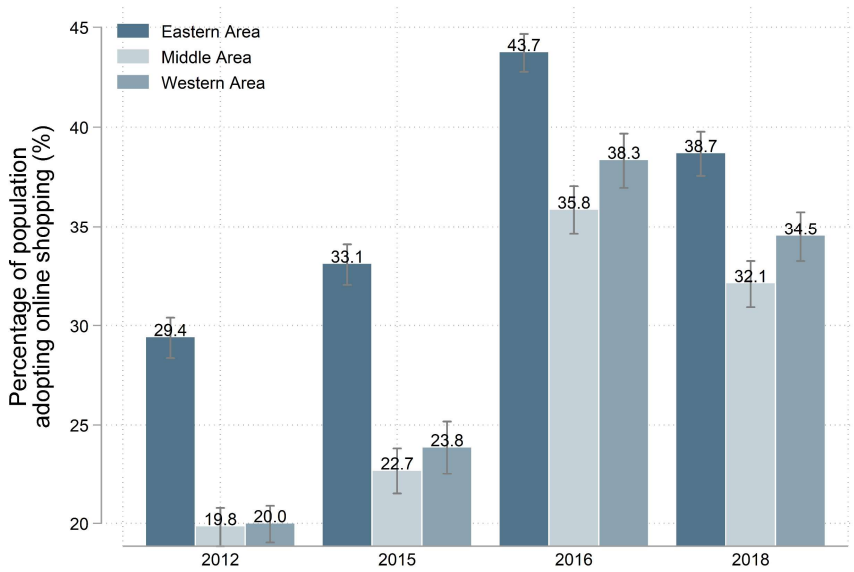
- **Extensive margin**: the percentage of the population adopting online shopping
  - *Data source*: China Household Finance Survey (CHFS) 2013-2019
    - ⋆ Since 2013, the CHFS has collected representative samples at both the nation and **province levels**.
  - $= 1$ if household online shopping expenses are positive, otherwise zero. Calculate the mean of the dummy variable using sampling weights by province and year.
  - A higher figure indicates more percentage of the population shopping online in a province.
  - A percentage measure for 2012, 2015, 2016, and 2018.
- **Intensive margin**: online retail transaction volumes per capita
  - *Data source*: National Bureau of Statistics
  - A firm-based measure involving online retail trading of goods (including virtual goods) and services.
  - Normalize the total volumes by province population.

A disparity between the measures

- **The percentage measure** reflects the behavior of online consumers.
- **Online retail transaction volumes** describes the behavior of online sellers, including their transactions with dealers within and outside the province.
  - By applying an IV strategy that utilizes variations in local Internet services, I can extract the variations driven by transactions realized by consumers within the same province, making the scope of the two measurements more comparable.
  - Therefore, the implications underlying OLS and IV estimates of the volume measurement are different.

Summary statistics





- There are ample room for the growth of e-commerce in China.
- The intensive margin is a more vital driver in the recent development of e-commerce in China.
- Regional disparities are huge.

Occupation and Income (CHFS)

- China Household Finance Survey (CHFS)
  - Baseline survey in 2011 and follow-ups in 2013, 2015, 2017, and 2019.
  - Gleans rich information on households and individuals' activities and socioeconomic characteristics.
- Utilize waves from 2011 to 2019.
- Restrict to the respondents aged 16-55 and exclude full-time students.
  - Minimize the selection problems due to education or retirement.

Occupation and Income (CHFS): outcomes

- Employment status
- Position
  - Employer or self-employed
  - Employee
  - Farmer
- Affiliated organizations
  - Public institution
  - Enterprise
  - Individual business or others
- Household income and personal wages

Summary statistics

	Full sample	Traced sample	High online retail per capita	Low online retail per capita	Diff.
Individual observations					
Have a job	0.77	0.78	0.78	0.77	0.01***
	(0.42)	(0.42)			
Employer or self-employed worker	0.10	0.10	0.11	0.09	0.02***
	(0.30)	(0.30)			
Employee	0.48	0.46	0.51	0.39	0.12***
	(0.50)	(0.50)			
Farmer	0.16	0.18	0.13	0.26	-0.13***
	(0.36)	(0.38)			
Work for public institutions	0.09	0.09	0.09	0.09	0.00***
	(0.29)	(0.29)			
Work for enterprises	0.27	0.25	0.29	0.19	0.11***
	(0.44)	(0.44)			
Work for individual businesses or others	0.14	0.14	0.14	0.13	0.01***
	(0.34)	(0.34)			
Ln(Wages)[1]	9.86	9.89	9.97	9.72	0.25***
	(1.48)	(1.40)			
Observations	247,898	170,309			
Household observations					
Ln(Total household incomes)	10.09	10.06	10.21	9.78	0.43***
	(2.22)	(2.17)			
Observations	148,392	110,571			

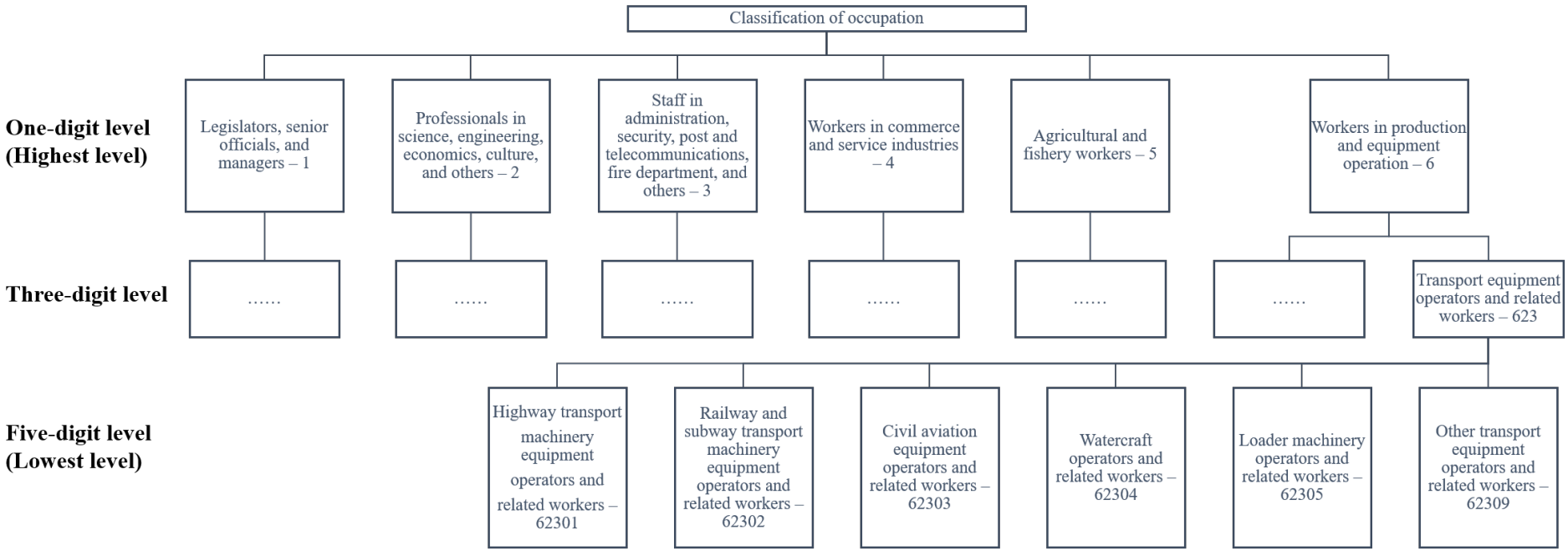
Occupation and Income (CFPS)

- China Family Panel Studies (CFPS)
  - Baseline survey in 2010 and follow-ups in 2012, 2014, 2016, 2018, and 2020.
  - Representative samples at the national levels.
  - Gleans accurate and detailed information on individual's occupation and affiliated industry.
    - ⋆ The occupation and industry are coded ex-post by professional staff.
- Utilize waves from 2010 to 2018.
- Restrict to the respondents aged 16-55 and exclude full-time students.

Occupation and Income (CFPS): outcomes

- Job-switching
  - By tracing an individual, I can identify to what extend one switch his/her occupation or working industry ▸ CSCO

Chinese Standard Classification of Occupations



Five-digit code, 8 general categories, more than 400 subdivisions ▸ Back

The SUCI Policy

- An ideal way is to gauge the degree of improvement in Internet services (higher speed and lower real prices) induced by the policy.
  - No such data.
- An alternative measure: News data

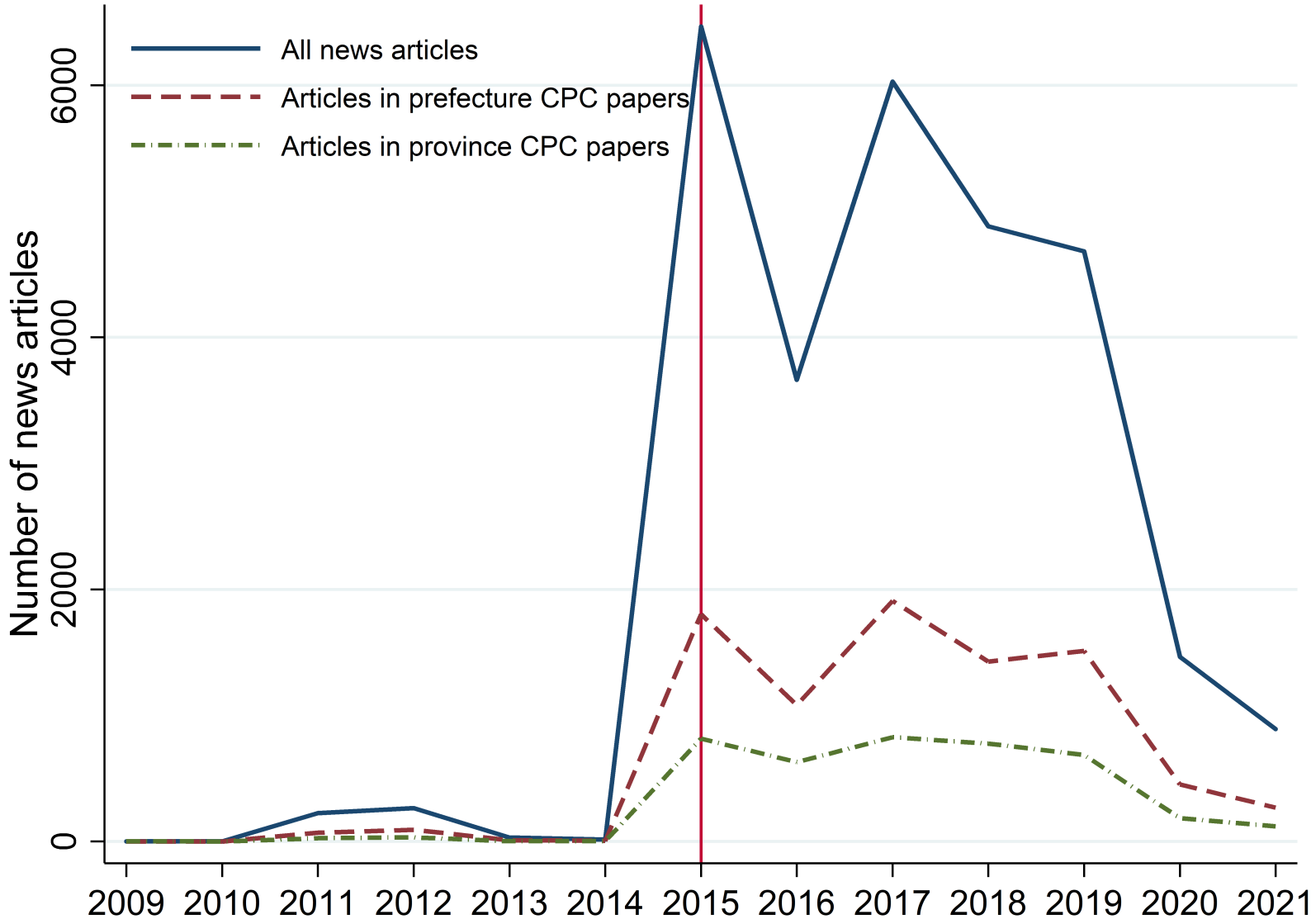
Institutional context of journalism in China

- Two types of newspapers in China
  - The newspapers of the Communist Party of China (CPC)
  - Unofficial commercial papers
- The CPC newspapers
  - Inform the public about policies or decisions of the Party and government (Zhao 1998).
  - The ownership structure and **circulation scope** of CPC newspapers parallels the administrative hierarchy: nation, province, and prefecture.
- Use the number of news articles published in the CPC newspapers mentioning the SUCI policy to measure the policy stringency.

Internet Policy Measurement: News-based

- Two sources
  - WiseNews database ▸ WiseNews → News records
  - Newspaper registered information, obtained from the National Press and Publication Administration → Papers' types
- Procedure
  - Retrieve news articles that contain the Chinese characters *"ti su jiang fei"* and *"wang luo"*(i.e., Internet), including their synonyms.
  - Obtain 28,622 news articles.
  - Keep the records published in the province and prefecture CPC newspapers (12,762, 45%).
- Contents of the articles
  - Declare the implementation of the policy
  - Propagate the achievement of the policy

Trends of the SUCI measurement



The SUCI Policy Measurement: News-based

- Aggregate the news records into a measurement at the provincial level

A weighted average

$$\widetilde{S}_{pt} = \sum_{i} \frac{pop_{i,2010}}{pop_{p,2010}} S_{ipt}$$

- $pop_{i,2010}$: population of administrative area i (could be province or prefecture) in year t
- $pop_{p,2010}$: population of province p in year t
- S_{it}: a record mentioning the policy in administrative area i, year t
- Calculate the accumulative number of the weighted sum and take the logarithm form of the measurement.

Does the news articles serve as a good measure?

	(1)	(2)	(3)	(4)	(5)
	Ln(Communication costs)		Ln(Internet users)		
Ln(Accumulative number of articles in CPC newspapers)	-0.093***	-0.015	0.177***	0.130**	0.130**
	(0.029)	(0.029)	(0.063)	(0.052)	(0.059)
Household workforce	0.345***	0.356***			
	(0.008)	(0.007)			
Rural areas	-0.801***	-0.633***			
	(0.018)	(0.019)			
Ln(Population)				0.079	0.079
				(0.553)	(0.932)
Ln(GDP in 2009 price)				0.886***	0.886**
				(0.213)	(0.331)
p-value (wild bootstrap)					0.07
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Province fixed effects	Yes		Yes	Yes	Yes
City fixed effects		Yes			
R-squared	0.22	0.26	0.99	0.99	0.99
Observations	148400	148400	217	217	217

Exogeneity of the IV

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Ln(Accumulative number of articles in CPC newspapers)									
Ln(Population)	1.682*									2.120
	(0.864)									(1.390)
Percentage of the population aged 0-14		2.835								2.346
		(1.957)								(4.185)
Percentage of the population aged 15-64			0.687							1.187
			(1.790)							(2.907)
Ln(GDP)				0.204						-0.552
				(0.290)						(1.486)
Ln(GDP in the primary sector)					0.074					0.087
					(0.180)					(0.298)
Ln(GDP in the secondary sector)						0.084				-0.227
						(0.144)				(0.725)
Ln(GDP in the tertiary sector)							0.311			0.216
							(0.348)			(0.793)
Ln(Consumption per capita)								0.259		-0.223
								(0.464)		(0.883)
Ln(Disposable income per capita)									0.715	1.569
									(0.754)	(1.593)
p-value (wild bootstrap)	0.08	0.17	0.72	0.49	0.72	0.57	0.41	0.59	0.35	
R-squared	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Observations	372	372	372	372	372	372	372	372	372	372

Firm-level data: investigate the mechanisms

- **Firm registration database**
  - Ownership
  - Business
  - Industry
  - Location
- Identify whether a firm conducts e-commerce-related businesses
  - Match the keyword *"e-commerce"* with firm names or business description text.
  - Encompass various direct or indirect e-commerce activities
    - ★ from electronic shopping services to e-commerce training programs.
  - Count the number of newly registered firms by business type (i.e., e-commerce related or not), prefecture, year, and industry.

Firm-level data: investigate the mechanisms

- **Annual Survey of Industrial Enterprises (ASIE)**
  - Covers above-scale enterprises in the manufacturing sector
  - Information on employment, industry, etc.
- **The Economic Census 2008**
  - Covers more sectors including the wholesale and retail trade, information and communication, etc.
  - Detailed information on the educational background of the employees.
- Merge the ICER with ASIE and the Economic Census based on firm names and locations, identidying firms conducting e-commerce-related businesses

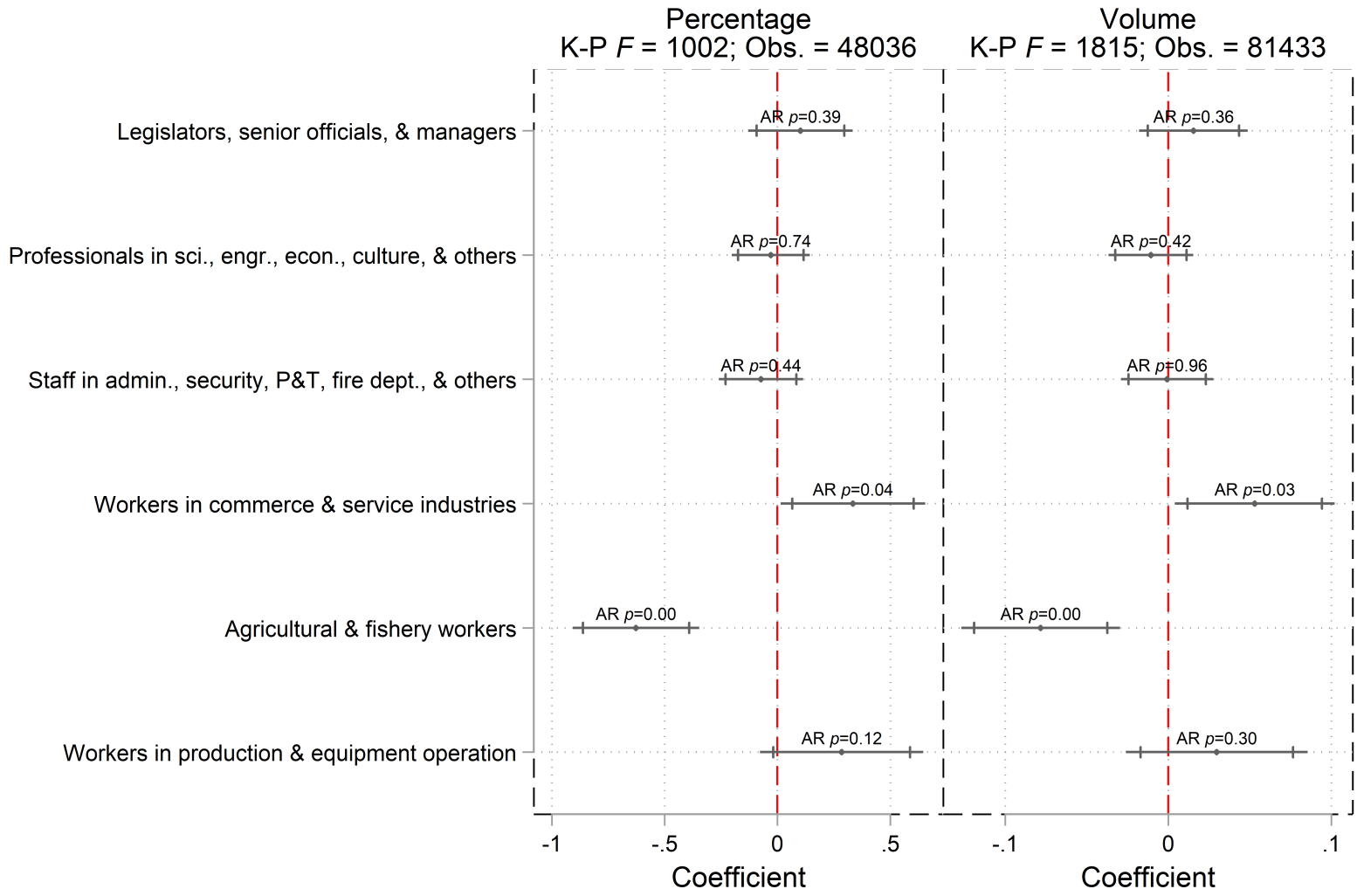
The impact of e-commerce on employment status

	(1)	(2)	(3)	(4)
	Have a job			
Data source	CHFS		CFPS	
Panel A: OLS estimates				
Percentage of population adopting online shopping	0.256***		0.496***	
	(0.026)		(0.043)	
Online retail transaction volumes per capita		0.055***		0.004
		(0.005)		(0.006)
R-squared	0.60	0.58	0.60	0.50
Panel B: IV estimates				
Percentage of population adopting online shopping	0.566***		0.983***	
	(0.115)		(0.152)	
Online retail transaction volumes per capita		0.180***		0.205***
		(0.037)		(0.025)
Anderson-Rubin test	0.00	0.00	0.00	0.00
First stage	0.039	0.114	0.043	0.168
	(0.001)	(0.003)	(0.001)	(0.003)
K-P *F* statistics	2346	1404	1531	2659
Observations	155954	170309	58631	104077
Individual fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes

The impact of e-commerce on positions

	(1)	(2)	(3)	(4)	(5)	(6)
	Employer or self-employed worker		Employee		Farmer	
Panel A: OLS estimates						
Percentage of population adopting online shopping	0.049***		0.598***		-0.344***	
	(0.017)		(0.029)		(0.019)	
Online retail transaction volumes per capita		-0.014***		0.058***		0.013***
		(0.004)		(0.006)		(0.004)
R-squared	0.66	0.64	0.69	0.67	0.72	0.71
Panel B: IV estimates						
Percentage of population adopting online shopping	0.076		1.260***		-0.493***	
	(0.082)		(0.129)		(0.095)	
Online retail transaction volumes per capita		-0.002		0.353***		-0.092***
		(0.025)		(0.041)		(0.030)
Anderson-Rubin test	0.35	0.93	0.00	0.00	0.00	0.00
First stage	0.039	0.114	0.039	0.114	0.039	0.114
	(0.001)	(0.003)	(0.001)	(0.003)	(0.001)	(0.003)
K-P *F* statistics	2346	1404	2346	1404	2346	1404
Observations	155954	170309	155954	170309	155954	170309

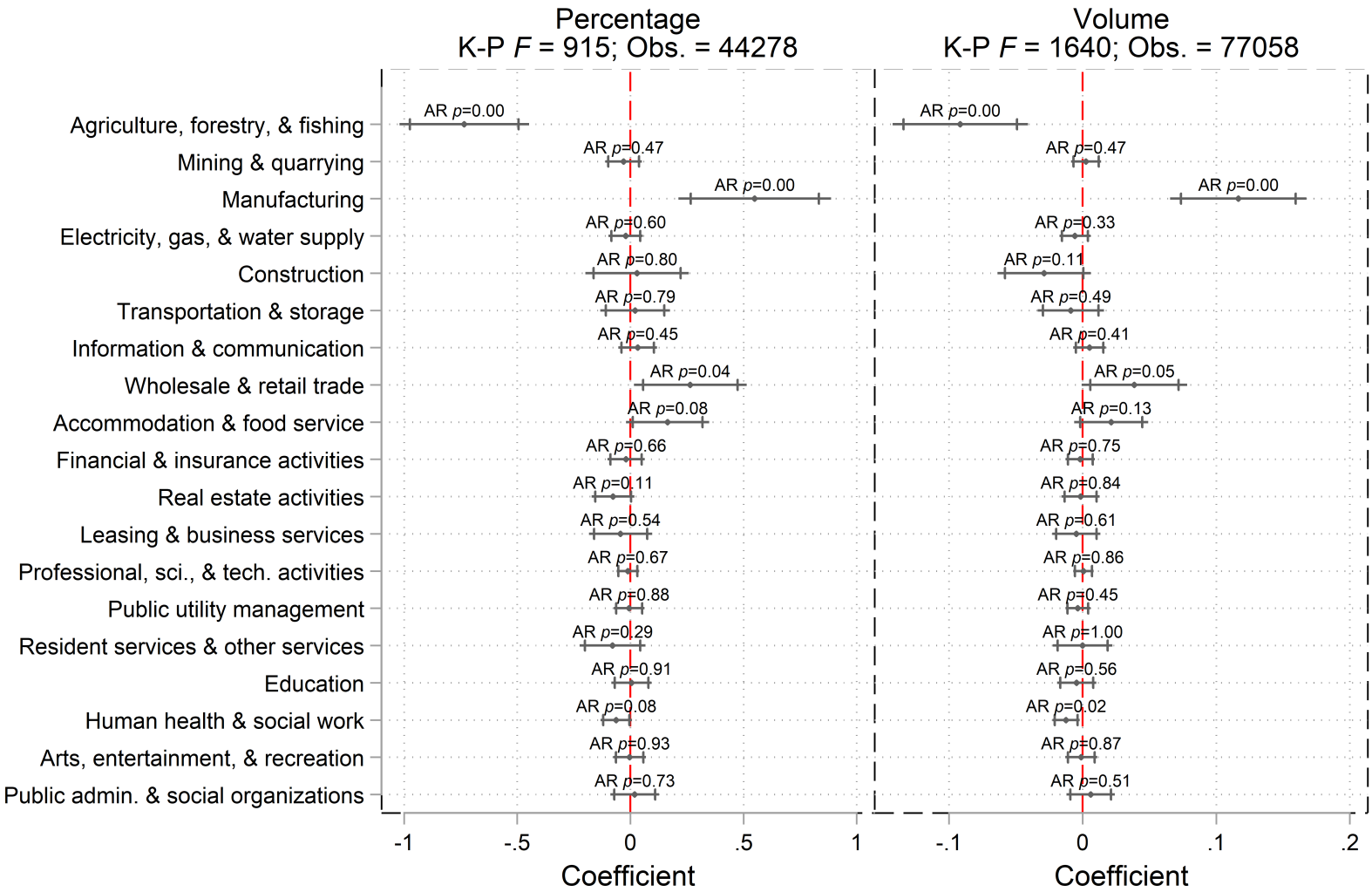
The impact of e-commerce on positions - detailed categories



The impact of e-commerce on employment providers

	(1)	(2)	(3)	(4)	(5)	(6)
	Public institution		Enterprise		Individual business and others	
Panel A: OLS estimates						
Percentage of population adopting online shopping	0.025*		0.367***		0.061**	
	(0.014)		(0.029)		(0.026)	
Online retail transaction volumes per capita		-0.004		0.075***		-0.011*
		(0.004)		(0.007)		(0.006)
R-squared	0.75	0.73	0.63	0.61	0.47	0.45
Panel B: IV estimates						
Percentage of population adopting online shopping	-0.076		1.054***		-0.185	
	(0.061)		(0.129)		(0.125)	
Online retail transaction volumes per capita		-0.007		0.340***		-0.060
		(0.019)		(0.040)		(0.036)
Anderson-Rubin test	0.22	0.72	0.00	0.00	0.14	0.10
First stage	0.039	0.114	0.039	0.114	0.039	0.114
	(0.001)	(0.003)	(0.001)	(0.003)	(0.001)	(0.003)
K-P *F* statistics	2346	1404	2346	1404	2346	1404
Observations	155954	170309	155954	170309	155954	170309

The impact of e-commerce on workforce distribution across industries



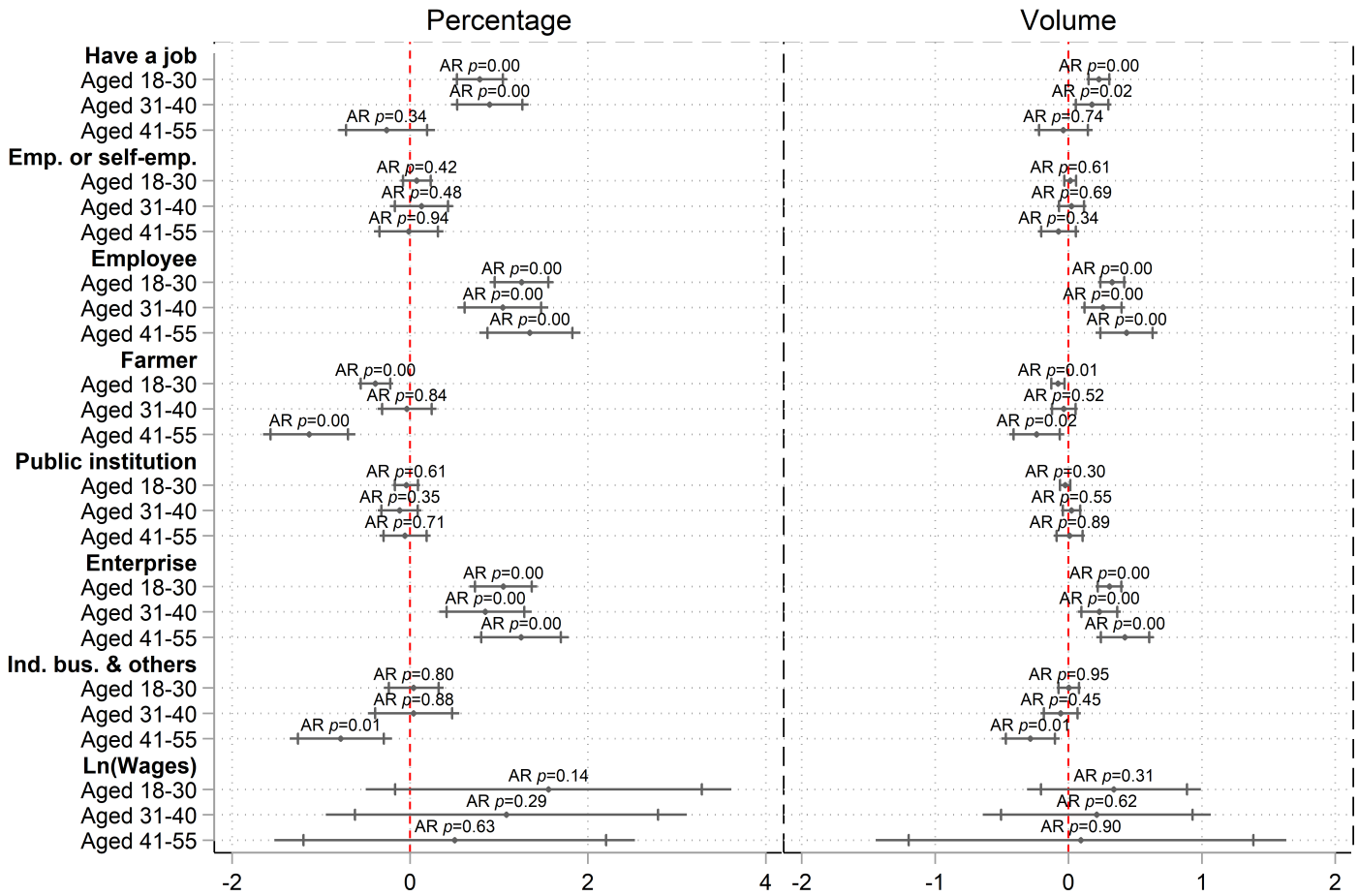
The impact of e-commerce on job-switching

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Change in occupations (1-digit)		Change in occupations (3-digit)		Change in occupations (5-digit)		Change in industries	
Panel A: OLS estimates								
Percentage of population adopting online shopping	0.066		0.109		0.113		0.088	
	(0.077)		(0.078)		(0.076)		(0.078)	
Online retail transaction volumes per capita		0.031**		0.026**		0.030**		0.016
		(0.012)		(0.012)		(0.012)		(0.013)
R-squared	0.56	0.52	0.61	0.58	0.65	0.62	0.59	0.55
Panel B: IV estimates								
Percentage of population adopting online shopping	0.661*		0.782**		1.016***		0.654*	
	(0.354)		(0.351)		(0.335)		(0.371)	
Online retail transaction volumes per capita		0.088		0.105*		0.146**		0.100
		(0.063)		(0.063)		(0.061)		(0.069)
Anderson-Rubin test	0.06	0.16	0.03	0.10	0.00	0.02	0.08	0.15
First stage	0.033 (0.002)	0.126 (0.006)	0.033 (0.002)	0.126 (0.006)	0.033 (0.002)	0.127 (0.006)	0.031 (0.002)	0.115 (0.006)
K-P *F* statistics	474	517	474	516	476	514	395	413
Observations	32789	43832	32785	43825	32558	43042	29225	39775

The impact of e-commerce on wages and incomes

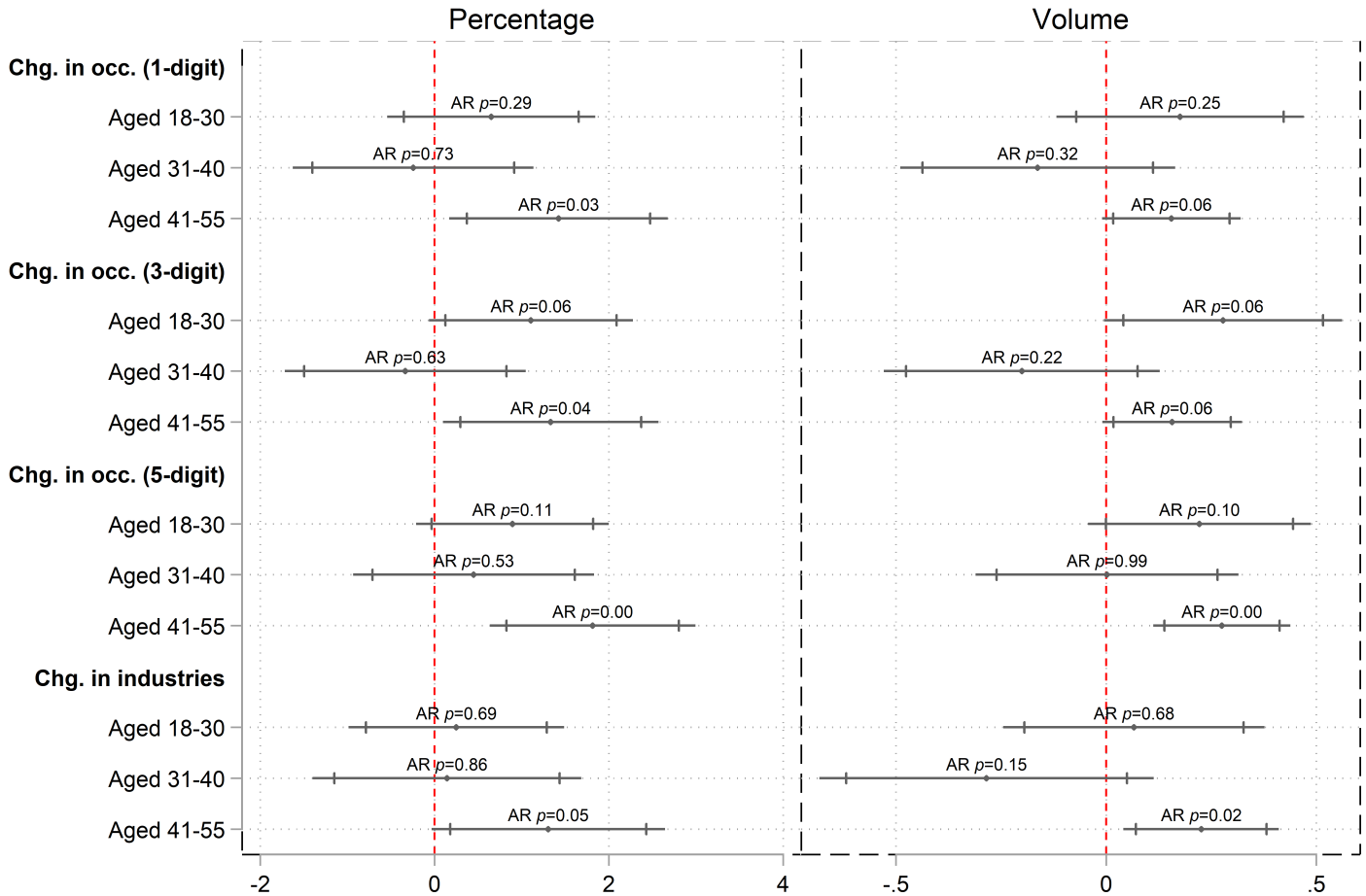
	(1)	(2)	(3)	(4)
	Ln(Total household income)		Ln(Wages)	
Panel A: OLS estimates				
Percentage of population adopting online shopping	-0.124		0.170	
	(0.193)		(0.179)	
Online retail transaction volumes per capita		0.070**		0.060*
		(0.032)		(0.034)
R-squared	0.52	0.51	0.54	0.53
Panel B: IV estimates				
Percentage of population adopting online shopping	4.305***		1.262**	
	(1.586)		(0.558)	
Online retail transaction volumes per capita		1.312**		0.348
		(0.526)		(0.235)
Anderson-Rubin test	0.01	0.01	0.02	0.14
First stage	0.018	0.051	0.050	0.113
	(0.001)	(0.002)	(0.001)	(0.006)
K-P *F* statistics	1101	459	1604	384
Observations	102632	110571	58863	62283
Household fixed effects	Yes	Yes		
Individual fixed effects			Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes

Heterogeneity: age group



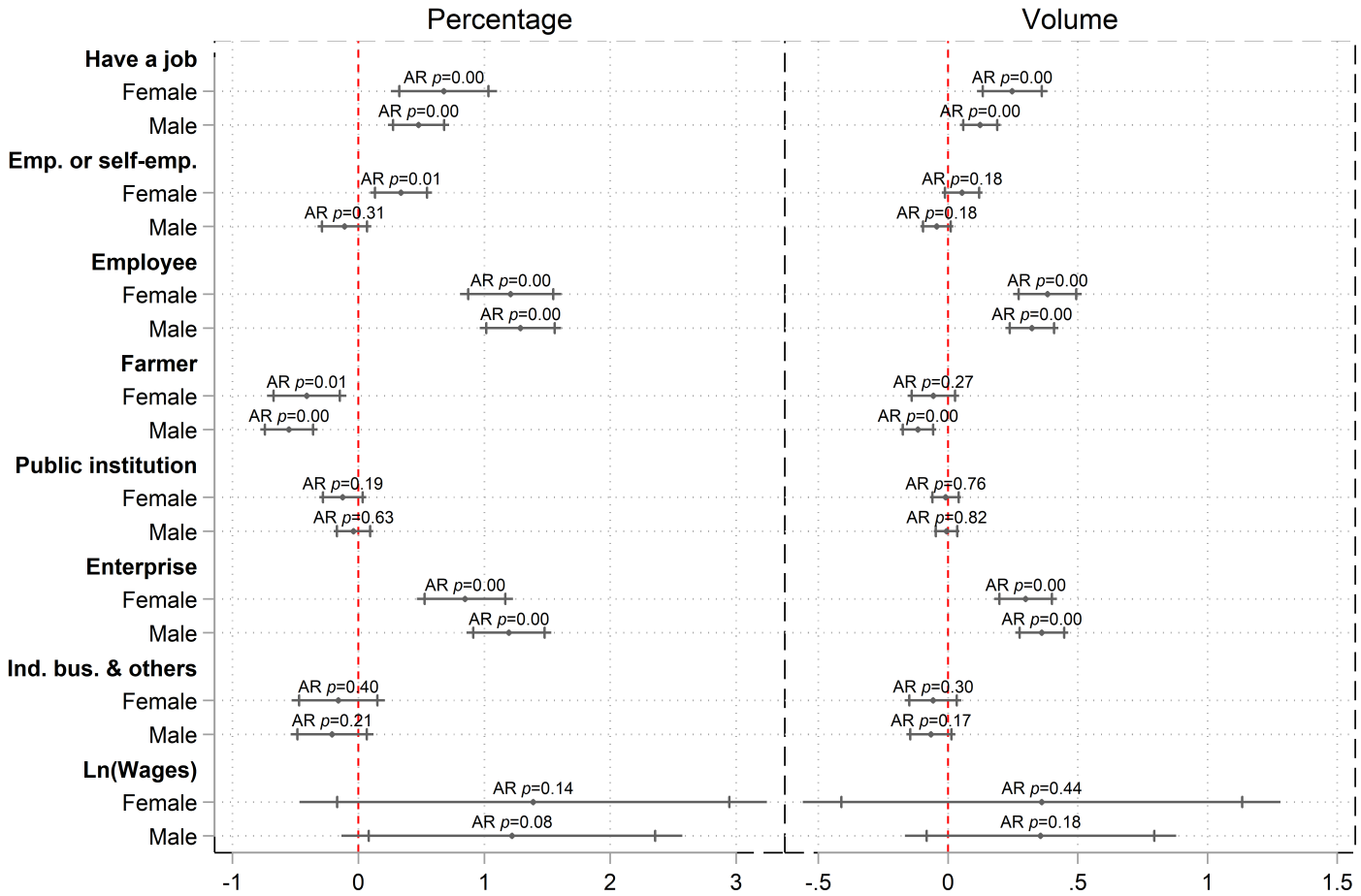
(1) Young- and middle-aged workforce benefits more.
(2) Older labor force could be losers.

Heterogeneity: age group



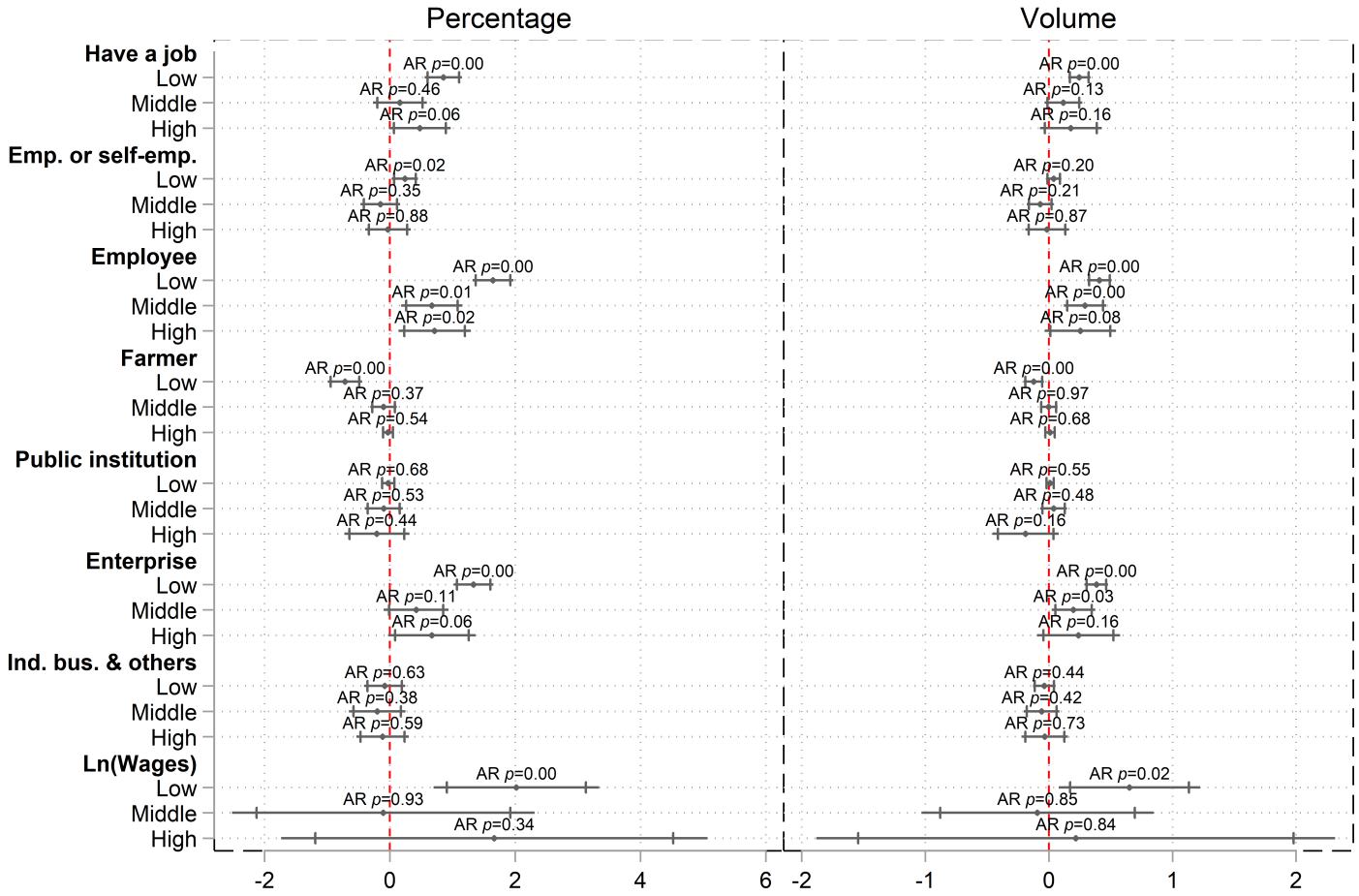
Older labor force who maintain employed tends to switch their jobs.

Heterogeneity: gender



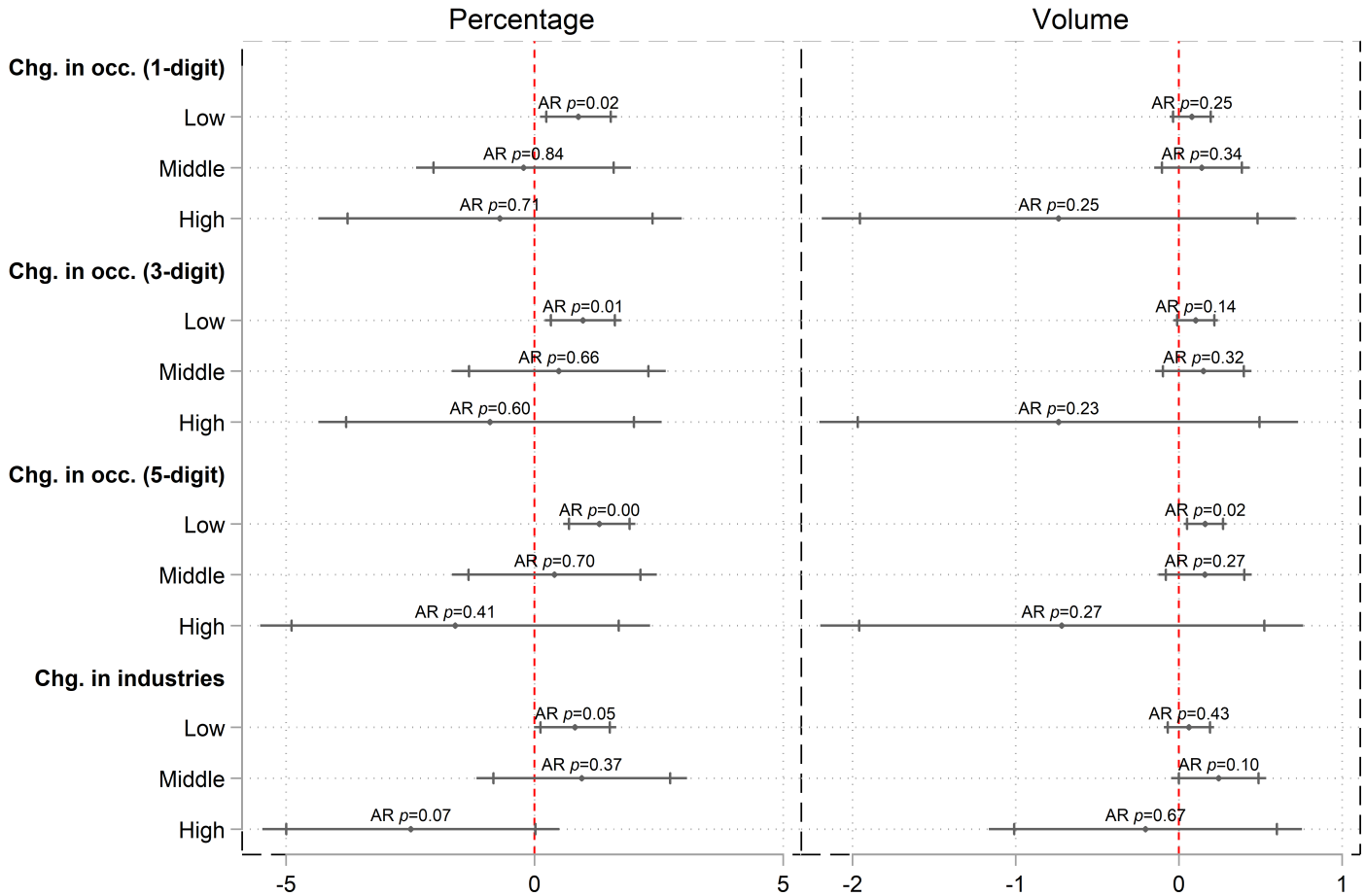
E-commerce encourages more females to start their own businesses.

Heterogeneity: education



(1) E-commerce increases employment rates of less-educated workers
(2) E-commerce relocates less-educated workers to jobs in enterprises with higher wages from the agricultural to manufacturing and service sectors.

Heterogeneity: education



Less-educated workers are more likely to switch occupations.

Evidence on the exclusion restriction of the IV

- Draw on the idea of the zero-first-stage (ZFS) test, first suggested by Bound and Jaeger (2000), but the logic is slightly different.
- Restrict the sample to respondents who are
  - locals (i.e., those who are not migrant workers)
  - never shop online
  - live in rural and economically underdeveloped areas
- These people should presumably be exempt from the impact of e-commerce.
- If the SUCI policy affects occupational choices only through the development of e-commerce, reduced-form regressions on this subsample, i.e., regressing employment outcomes on the policy stringency measurement, should yield insignificant estimates.

Evidence on the exclusion restriction of the IV

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
GDP level	Have a job	Employer or self-employed worker	Employee	Farmer	Public institution	Enterprise	Individual businesses and others	Ln(Wages)
Panel A: Low								
L1.Ln(Accumulative Number of articles in CPC newspapers)	-0.030	0.014	-0.015	0.007	0.016	-0.030	-0.001	-0.147
	(0.028)	(0.014)	(0.025)	(0.030)	(0.011)	(0.020)	(0.023)	(0.236)
R-squared	0.56	0.54	0.62	0.63	0.57	0.56	0.47	0.55
Observations	11380	11380	11380	11380	11380	11380	11380	1201
Panel B: Middle								
L1.Ln(Accumulative Number of articles in CPC newspapers)	-0.027	0.008	0.026	-0.065***	0.010	0.019	0.003	-0.081
	(0.017)	(0.010)	(0.018)	(0.021)	(0.008)	(0.014)	(0.017)	(0.180)
R-squared	0.58	0.57	0.65	0.67	0.61	0.57	0.51	0.56
Observations	10374	10374	10374	10374	10374	10374	10374	1629
Panel C: High								
L1.Ln(Accumulative Number of articles in CPC newspapers)	0.031*	0.022**	0.003	0.023	-0.010	0.029*	-0.008	-0.046
	(0.017)	(0.011)	(0.018)	(0.019)	(0.007)	(0.015)	(0.017)	(0.125)
R-squared	0.58	0.60	0.64	0.68	0.61	0.56	0.49	0.50
Observations	12235	12235	12235	12235	12235	12235	12235	2276

Evidence on the exclusion restriction of the IV

	(1)	(2)	(3)	(4)
GDP level	Change in occupations (1-digit)	Change in occupations (3-digit)	Change in occupations (5-digit)	Change in industries
Panel A: Low				
L1.Ln(Accumulative number of articles in CPC newspapers)	-0.037	-0.081	-0.064	-0.027
	(0.055)	(0.052)	(0.054)	(0.056)
R-squared	0.58	0.66	0.68	0.56
Observations	3230	3230	3228	3041
Panel B: Middle				
L1.Ln(Accumulative number of articles in CPC newspapers)	0.056	0.066*	0.074**	0.046
	(0.034)	(0.034)	(0.033)	(0.029)
R-squared	0.58	0.64	0.68	0.59
Observations	3560	3560	3558	3252
Panel C: High				
L1.Ln(Accumulative number of articles in CPC newspapers)	0.062**	0.058**	0.061**	0.060**
	(0.027)	(0.027)	(0.025)	(0.027)
R-squared	0.55	0.61	0.67	0.55
Observations	3971	3971	3968	3501

Robustness checks

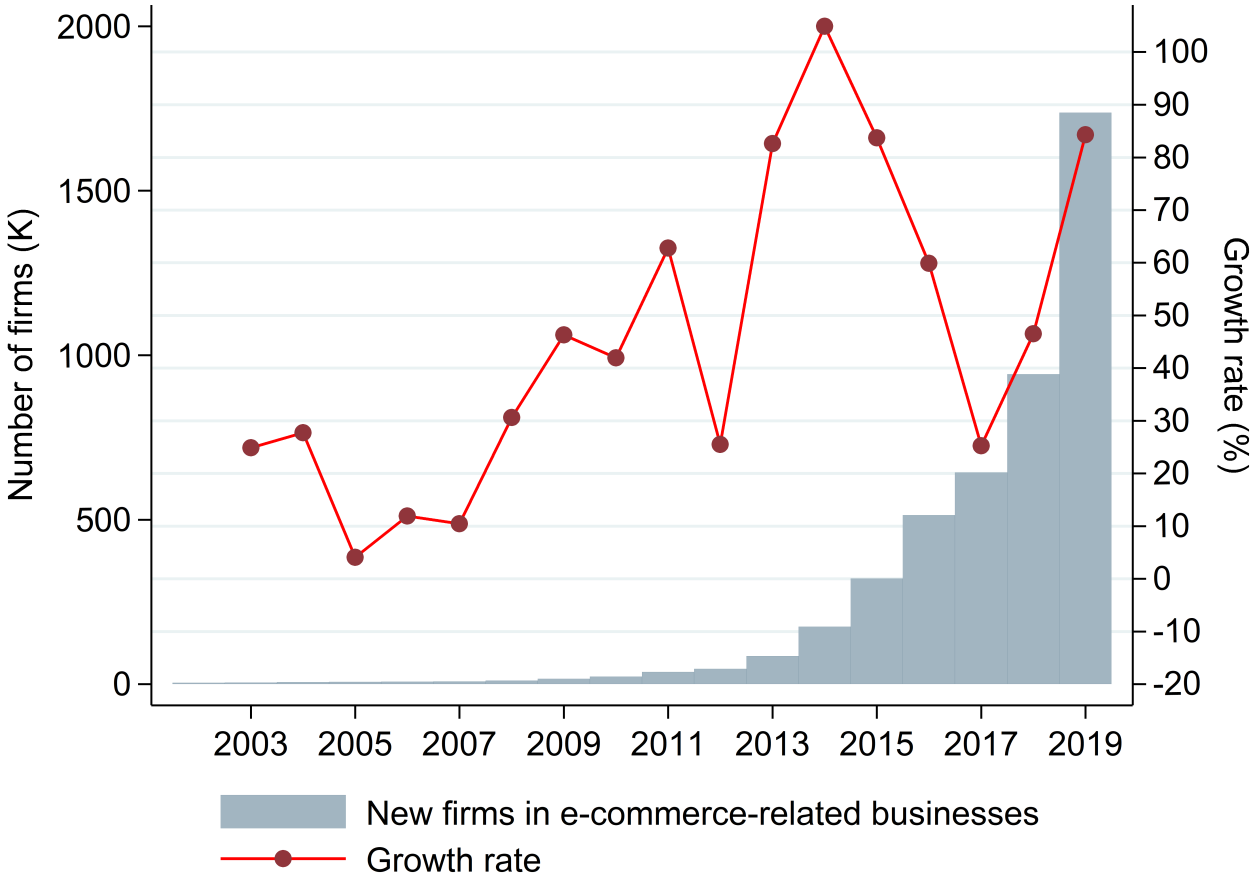
1. Alternative measures of e-commerce
   - The logarithm form of online retail transaction volumes
   - The logarithm form of average monthly expenditure on online shopping per capita in a province, estimated from the CHFS data
2. Alternative clustering levels of standard errors
   - People from the same community are not independent as they face the same labor market conditions.
   - Cluster *se* at the individual and community-by-year levels
3. Include additional time-variant controls, capturing the development of Internet infrastructure and individual Internet usage

Although the magnitude differs slightly, the main results maintain across different robustness checks.

Summary of the results

- E-commerce increases average employment rates, individual wages, and total household incomes.
  - Young- and middle-aged workers benefit more.
  - Less-educated workers can also benefit from it.
- People exposed to active e-commerce markets are more likely to
  - Quit the agricultural sector
  - Get employed in enterprises of the manufacturing and service sectors
- With the creative destruction brought by e-commerce, people tend to change occupations and have to handle new tasks.
  - Especially older ones

New firms conducting e-commerce-related businesses



Source: the Industrial and Commercial Enterprise Registration Database

The impact of e-commerce on newly registered firms

	(1)	(2)	(3)	(4)	(5)	(6)
	Ln(Number of new firms)		Ln(Number of new firms conducting e-commerce -related businesses)		Percentage of new firms conducting e-commerce	
Panel A: OLS estimates						
Percentage of population adopting online shopping	0.025		-0.302		-0.003	
	(0.292)		(0.408)		(0.027)	
Online retail transaction volumes per capita		0.017		0.114		0.035***
		(0.080)		(0.142)		(0.007)
R-squared	0.98	0.98	0.96	0.95	0.68	0.48
Panel B: IV estimates						
Percentage of population adopting online shopping	-0.546		2.325		0.539***	
	(1.697)		(2.412)		(0.166)	
Online retail transaction volumes per capita		-0.272		0.561**		0.061***
		(0.202)		(0.257)		(0.014)
Number of clusters	327	357	327	357	327	357
Anderson-Rubin test	0.74	0.13	0.33	0.03	0.00	0.00
First stage	0.016 (0.004)	0.130 (0.023)	0.016 (0.004)	0.130 (0.023)	0.016 (0.004)	0.130 (0.023)
K-P *F* statistics	18	33	18	33	18	33
Observations	1302	3550	1302	3550	1302	3550

The impact of e-commerce on manufacturing firms' employment

	(1)	(2)	(3)	(4)	(5)	(6)
	Ln(Number of employees)					
Online retail transaction volumes per capita	0.518***	0.324**			0.323**	0.272**
	(0.143)	(0.140)			(0.140)	(0.126)
Firms running e-commerce-related businesses			0.085***	0.131***	0.129***	0.115***
			(0.027)	(0.026)	(0.026)	(0.022)
Firm age		0.022***		0.022***	0.022***	0.023***
		(0.001)		(0.001)	(0.001)	(0.001)
Firm age squared		-0.000***		-0.000***	-0.000***	-0.000***
		(0.000)		(0.000)	(0.000)	(0.000)
R-squared	0.77	0.77	0.77	0.77	0.77	0.79
Year fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effect						Yes
City fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2982543	2982543	2982543	2982543	2982543	2982543

The impact of e-commerce on firms' employment

	(1)	(2)	(3)	(4)	(5)	(6)
	Ln(Number of employees)		Ln(Number of female employees)		Ln(Number of employees with a junior high education or below)	
Firms in e-commerce-related businesses	0.283***	0.306***	0.295***	0.314***	0.038	0.057*
	(0.049)	(0.051)	(0.050)	(0.051)	(0.032)	(0.033)
Firm age		0.042***		0.036***		0.031***
		(0.005)		(0.004)		(0.005)
Firm age squared/100		-0.043***		-0.040***		-0.025***
		(0.006)		(0.005)		(0.004)
R-squared	0.25	0.28	0.16	0.18	0.30	0.31
	Ln(Number of employees with senior high education)		Ln(Number of employees with junior college education)		Ln(Number of employees with bachelor degrees or above)	
Firms in e-commerce-related businesses	0.174***	0.194***	0.295***	0.308***	0.260***	0.270***
	(0.048)	(0.050)	(0.044)	(0.045)	(0.036)	(0.036)
Firm age		0.036***		0.024***		0.019***
		(0.004)		(0.004)		(0.003)
Firm age squared/100		-0.034***		-0.026***		-0.023***
		(0.005)		(0.006)		(0.005)
R-squared	0.22	0.24	0.13	0.14	0.17	0.18
Observations	2596199	2596199	2596199	2596199	2596199	2596199

Summary

- The online consumption market facilitates the establishment of firms running e-commerce-related businesses
  - Implying the creation of jobs.
- Both province-level e-commerce market development and firms' running e-commerce-related businesses are associated with more employment in the manufacturing sector.
- Firms running e-commerce-related businesses in the service sector tend to employ less-educated workers.

Concluding remarks

- This paper uses large, nationally representative Chinese data to identify the causal impact of e-commerce on labor market outcomes.
  - The results further our understanding of e-commerces socioeconomic impacts.
- Due to the limitation of the measurements, the details underlying some heterogeneity patterns remain unclear.
  - Novel data may be needed for further analyses, such as job vacancy data.

THANK YOU !