

# Are Routine Jobs Moving South?

Evidence from Changes in the Occupational Structure of  
Employment in the U.S. and Mexico

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- Falling share of employment in routine task-intensive, middle-wage jobs
- Widely documented across developed countries (Goos, Manning & Salomons, 2009; Acemoglu & Autor, 2011)
- Potential driving forces:
  - ① Falling trade/offshoring costs: e.g. Antras, Garicano & Rossi-Hansberg (2006), Egger, Kreickemeier, Moser & Wrona (2016)
  - ② Routine-replacing technological change: e.g. Autor, Levy & Murnane (2003), Goos & Manning (2007)
- These two driving forces have very different implications in terms of patterns that should be observed in **developing countries**

## 1 Falling trade/offshoring costs:

- Routine jobs moving South
- Should observe an **increase** in routine employment in countries such as Mexico
  - “Our jobs are fleeing the country, they are going to Mexico, and many other countries” (Donald Trump, 2016)

## 2 Routine-replacing technological change:

- Routine jobs disappearing everywhere
  - Either because of technology diffusion, or because of re-shoring (Artuc, Christiaensen & Winkler, 2019; Faber, 2019)
- Should observe a **decrease** in routine employment in countries such as Mexico

- Contrast changes in occupational structure of employment in the U.S. and Mexico
- Use **detailed (181) job categories** based on matching of occupational codes (job titles)
- Compare evolution of employment across common occupational categories, not along the occupational wage distribution
  - Middle-wage jobs in the U.S. need not be middle-wage jobs in Mexico
- Determine whether occupations that are declining in the U.S. are growing or shrinking in Mexico

# Key Findings

- Employment share changes **consistently positively correlated** across the two countries in the 2000s
  - Vast majority of middle-skill occupations that decline in the U.S. also decline in Mexico
- Cross-country correlation in employment share changes very weak in the 1990s

## Takeaways:

- No support for hypothesis that declining U.S. jobs have moved to Mexico
- Common shocks (e.g. technology, rise of China) seem a more likely driver of the changes

## ● **Offshoring/Technology Literature:**

- So far, offshoring literature mainly focused on impacts on skill premium [e.g. Goldberg & Pavcnik (2007), Autor, Dorn & Hanson (2013), Acemoglu, Gancia & Zilibotti (2015), Burstein & Vogel (2017), Hummels, Munch & Xiang (2018)]
- We explore basic underlying idea that certain types of jobs (occupations) are moving to developing countries due to falling trade/offshoring costs
- Related to Faber (2019); Artuc, Christiaensen & Winkler, who study how adoption of robots in developed countries impacts Mexico

## ● **Polarization Literature:**

- So far, limited evidence on de-routinization outside of high-income countries [exceptions: World Bank (2016), Ariza & Raymond Bara (2018), Reijnders & de Vries (2018)]
- New evidence for Mexico; much finer level of detail; US-Mexico comparison; updated US patterns

## **National Labor Force Survey micro-data** for both countries

### **Mexico:**

- *Encuesta Nacional de Empleo* (ENE); *Encuesta Nacional de Ocupación y Empleo* (ENOE)
- Quarterly frequency; 2001–2018
- ~ 586,000 obs per year

### **United States:**

- Current Population Survey (CPS)
- Monthly frequency
- ~ 717,000 obs per year

# Sample Restrictions

- Civilian workers aged 16–65
- Non-missing information on current occupation
- Exclude workers in agriculture and farming occupations
- Mexican data includes both formal and informal sector workers



**Table:** Descriptive Statistics for Employed Workers

	<b>U.S.</b>		<b>Mexico</b>	
	2003	2018	2003	2018
Average Age	39.37	40.62	35.57	38.18
Fraction Female	47.09	47.39	39.28	42.43
Average Real Wage (2009 USD)	19.91	21.42	2.33	2.04
Manufacturing Share of Emp	12.55	10.25	20.93	19.15
<i>Educational Composition:</i>				
Elementary Education or Less	1.94	1.46	38.81	18.88
Middle School	8.26	5.39	32.53	29.27
High School	60.15	55.39	13.58	26.82
College Education or Higher	29.65	37.77	15.08	25.04
Nr of Observations (Unweighted)	774,379	652,000	707,823	592,622

# Matching Occupation Codes

We **match occupation codes** across the two countries in order to compare the evolution of employment by occupation

Matching based on **job titles**: e.g., “accountants and auditors”, “lawyers and judges”

**181 occupational categories** matched across the two countries

# Occupation Matching: Examples

Code	Occupation Description	occ1990dd Codes	CMO Codes	SINCO Codes
49	Librarians and Archivists	164, 165, 329	1174	2144
50	Economists, Market and Survey Researchers	166, 386	1170	2123
51	Psychologists	167, 163	1164	2142
52	Social Workers	377, 174, 177	1250	2143, 2531, 2532
53	Social Scientists and Sociologists, n.e.c.	169	1161, 1169	2132
54	Clergy and Religious Workers	176	1180, 1260	2533, 2145
55	Lawyers and Judges	178, 234	1160	2135
56	Writers and Authors	183, 184, 195, 384	1400, 1401	2151, 2152, 2153
57	Designers	185, 789	1423	2541, 2542, 2543, 2544
58	Musicians and Singers	186	1410, 1411, 1412	2171, 2172, 2173

# Occupation Matching: Examples

Code	Occupation Description	occ1990dd Codes	CMO Codes	SINCO Codes
180	Truck, Delivery, and Tractor Drivers	804	5502, 5521	8341, 8352
181	Bus and Taxi Cab Drivers, and Chauffeurs	808, 809	5520, 8202	8342, 8343
182	Railroad Conductors and Yardmasters	823, 824, 825	5510, 5511	8331, 9312
183	Ship Crews and Marine Engineers	829	5540, 5541, 5542, 5543, 5549	8321, 8322, 8323, 8324
184	Miscellaneous Transportation Occupations	834, 813, 885	5550, 5551, 5500, 5590, 5529	6311, 9321, 9322, 8344, 8349
185	Stevedores and Misc. Material Moving Occupations	859	8126	9331
186	Helpers in Construction Work	865, 869	5460, 5269	7113, 9221
187	Laborers, n.e.c.	889	5450, 5420, 5231, 5253, 5281, 8121, 8140, 8152, 5239, 5259, 5290, 9999	9733, 7614, 7313, 5252, 7412, 9237, 9235, 9999, 7999, 4312

# Grouping of Occupations

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Occupation Group	Occupation Codes (occ.mxus)
<b>Non-Routine Cognitive (NRC)</b>	
Executive, Administrative, and Managerial Occ	1 – 9
Management Related Occupations	10 – 22
Professional Specialty Occupations	23 – 65
Technicians and Related Support Occupations	66 – 72
<b>Routine Cognitive (RC)</b>	
Sales Occupations	73 – 81
Administrative Support Occupations	82 – 96
<b>Routine Manual (RM)</b>	
Mechanics and Repairers	123 – 129
Construction Trades	130 – 141
Extractive Occupations	142 – 145
Precision Production Occupations	146 – 160
Machine Operators, Assemblers, and Inspectors	161 – 179
Transportation and Material Moving Occupations	180 – 187
<b>Non-Routine Manual (NRM)</b>	
Housekeeping and Cleaning Occupations	97, 98
Protective Service Occupations	99 – 104
Other Service Occupations	105 – 117

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# Point-in-Time Comparisons

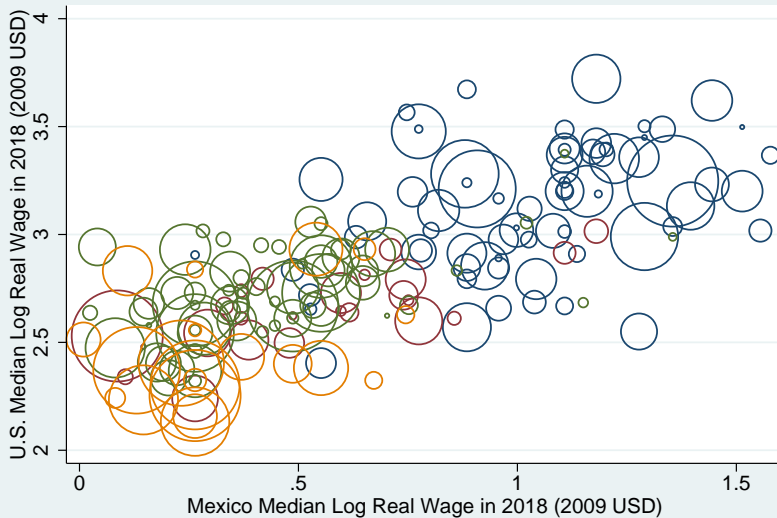
# Are Occupational Wage Rankings Similar?

Panel A: Median Log Real Wages, 2003



# Are Occupational Wage Rankings Similar?

Panel B: Median Log Real Wages, 2018

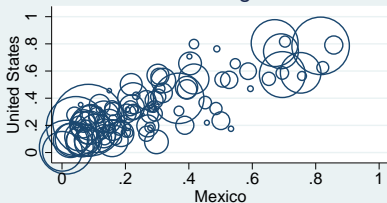




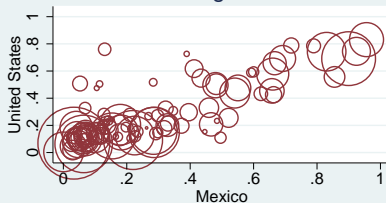
# Do Industries use a Similar Occupational Mix?

## Occupational Employment Shares By industry, 2005

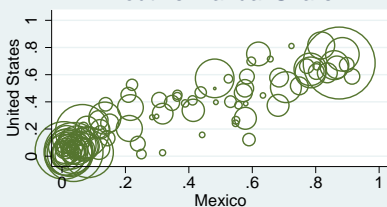
### Non-Routine Cognitive Share



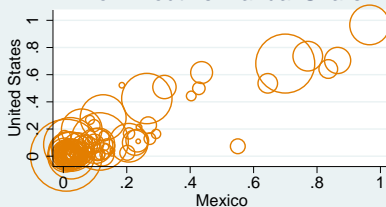
### Routine Cognitive Share



### Routine Manual Share



### Non-Routine Manual Share



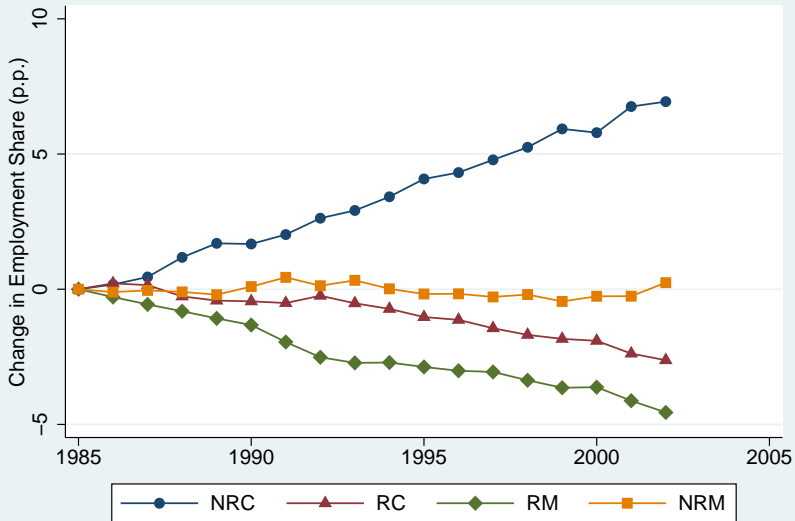
# Takeaways

- Remarkably strong correlation in occupational wage rankings across the two countries
  - NRC occupations high-paying and NRM occupations low-paying in both countries
  - Similar occupational mix used within industries in both countries
- ⇒ Should observe opposing employment share changes across the two countries not only if performance of certain tasks is offshored, but also if entire production process of a particular industry is offshored

# **Employment Changes: Broad Occupation Groups**

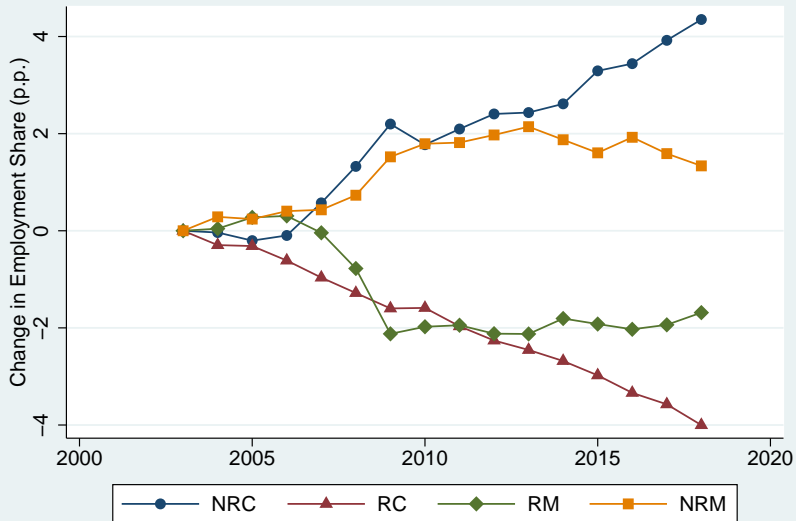
# Employment Share Changes: US

Panel A: United States, 1985–2002



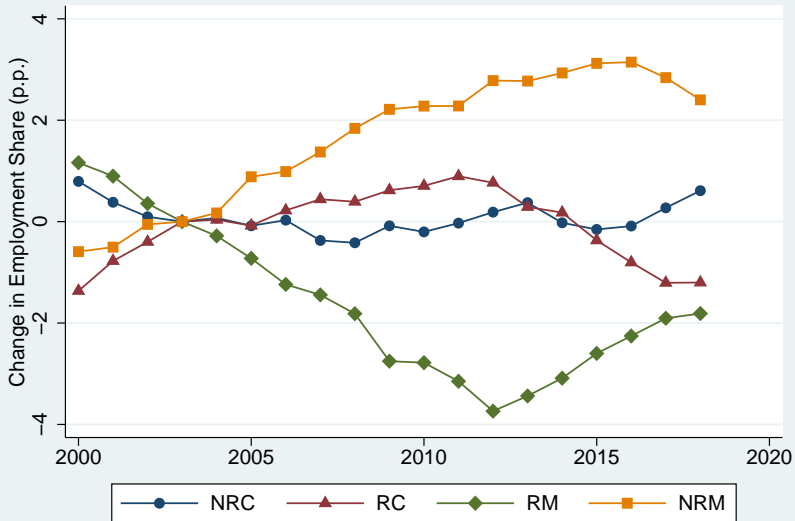
# Employment Share Changes: US

Panel B: United States, 2003–2018



# Employment Share Changes: Mexico

Panel C: Mexico, 2000–2018



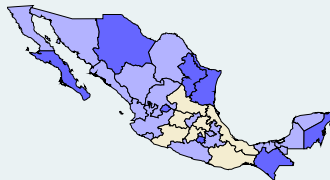
# Employment Share Changes: Mexico, 2003–2011

Panel A: 2003–2011

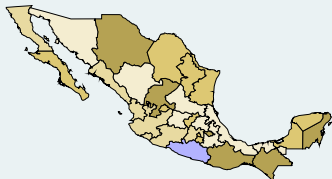
Non-Routine Cognitive



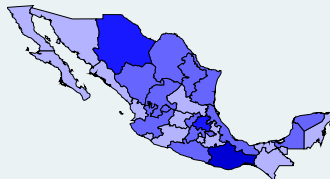
Routine Cognitive



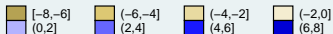
Routine Manual



Non-Routine Manual



Change in Employment Share (p.p. change)



# Employment Share Changes: Mexico, 2013–2018

Panel B: 2013–2018

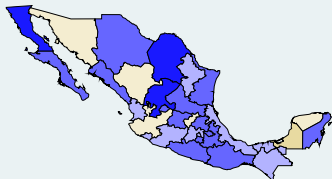
Non-Routine Cognitive

Routine Cognitive



Routine Manual

Non-Routine Manual



Change in Employment Share (p.p. change)

[-6, -4]

(0, 2]

[-4, -2]

(2, 4]

[-2, 0]

(4, 6]



# **Employment Changes: Detailed Occupation Groups**

# Main Result: Emp Share Chgs, 2003–11, US vs MX



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**Table:** Occupations with largest declines in emp shares in the U.S., 2003–11

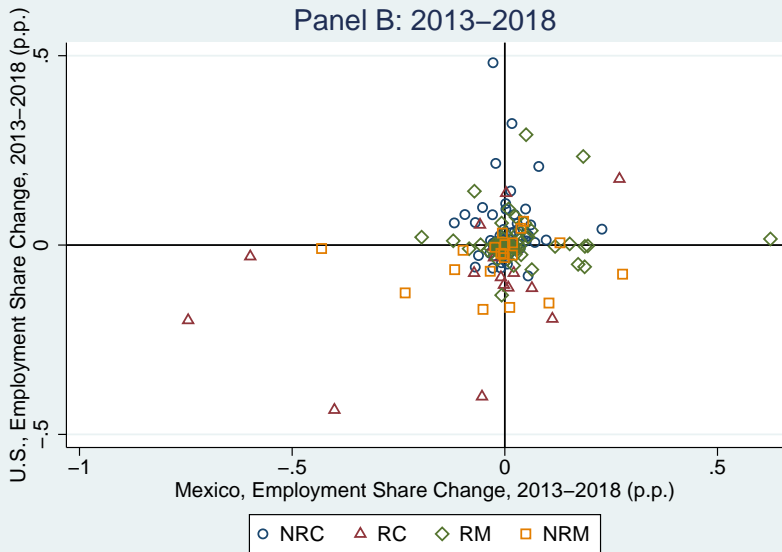
	Group	Chg in Emp Share (p.p.)	
		U.S.	Mexico
Secretaries, Typists and Stenographers	RC	-0.790	-0.544
Sales Supervisors and Proprietors	RC	-0.407	0.003
Supervisors, n.e.c.	NRC	-0.327	0.056
Assemblers of Electrical Equipment	RM	-0.222	-0.279
Carpenters	RM	-0.209	-0.228
Supervisors of Construction Work	NRC	-0.201	0.022
Accounting and Auditing Sales Occupations	RC	-0.196	0.036
Salespersons, n.e.c.	RC	-0.195	0.001
Truck, Delivery, and Tractor Drivers	RM	-0.177	0.266
Records Clerks	RC	-0.169	-0.020
Machine Operators, n.e.c.	RM	-0.151	0.015
Textile Sewing Machine Operators	RM	-0.148	-0.639

# Main Result: Emp Share Chgs, 2003–11, US vs MX

**Table:** Occupations with largest increases in emp shares in the U.S., 2003–11

	Group	Chg in Emp Share (p.p.)	
		U.S.	Mexico
Lawyers and Judges	NRC	0.149	0.169
Salespersons	RC	0.150	0.768
Cooks	NRM	0.168	0.811
Primary School Teachers	NRC	0.190	-0.068
Bartenders and Waiters/Waitresses	NRM	0.195	0.202
Cashiers, Account Collectors and Clerks	RC	0.202	0.084
Other Technicians	NRC	0.218	0.114
Health Technicians and Record Technologists	NRC	0.252	0.001
Management Support Occupations	NRC	0.263	-0.003
Managers and administrators, n.e.c.	NRC	0.304	-0.014
Nurses, Therapists and Other Health Occupations	NRC	0.455	0.114
Personal Service Occupations	NRM	0.612	0.235

# Emp Share Chgs, 2013–18, US vs MX



# Summary: Emp Share Chgs, US vs MX

- Positive correlation in employment share changes across countries
  - +0.31 for 2003–2011, +0.24 for 2013–2018
  - Statistically significant at 1% level in both periods
- Most RM occupations that feature strong declines in US prior to 2011 also decline in Mexico
  - Main exception: truck drivers; unlikely to be driven by offshoring
- Most RC occupations decline strongly in both countries in recent years

# Focusing on the Auto Industry

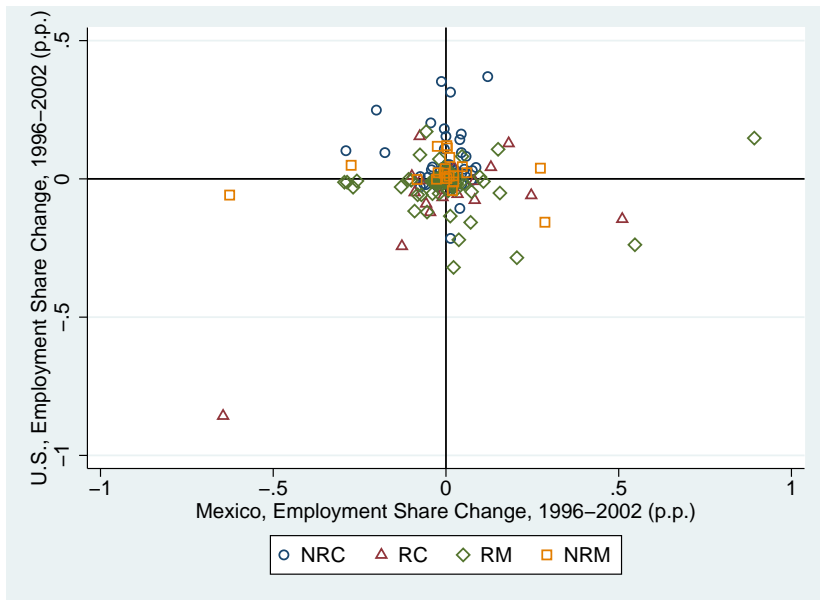
Panel A: Share of Aggregate Employment  
Manufacturing of Transp Vehicles and Related Equipment







# Were Things Different in the 90s?



# Were Things Different in the 90s?

- Correlation coefficient for 1996–2002 changes is  $+0.16$  (p-value 0.03)
    - But largely driven by strong decline in “secretaries, typists and stenographers” in both countries
  - Excluding this occupations, correlation coefficient is  $-0.06$  (p-value 0.40)
- ⇒ Even in the 1990s, little evidence of systematic movement of U.S. jobs to Mexico

- We compare employment patterns across 181 detailed occupational categories in the U.S. and Mexico
  - Positive correlation in employment share changes across the two countries, even when considering routine manual jobs within the auto manufacturing sector
- ⇒ Little support for hypothesis that jobs have moved from the U.S. to Mexico in the 2000s
- Occupational inputs across countries seem complementary rather than substitutes
  - Common shocks impacting both countries (e.g. technological change, rise of China) a more likely explanation for the observed patterns

**Thank you!**