

Timing is Everything: Labor Market Winners and Losers during Boom-Bust Cycles

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SOLE

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 - > **Which types of workers are most vulnerable?**

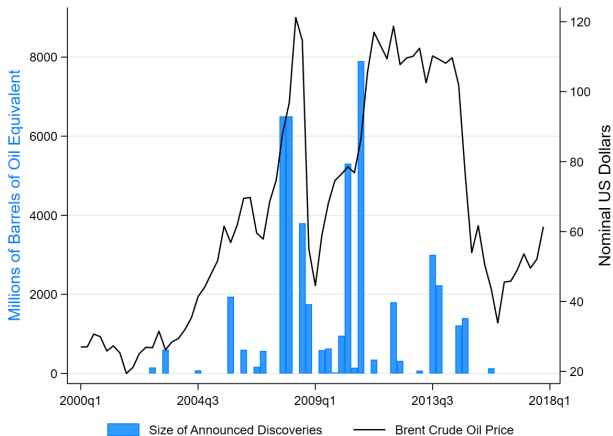
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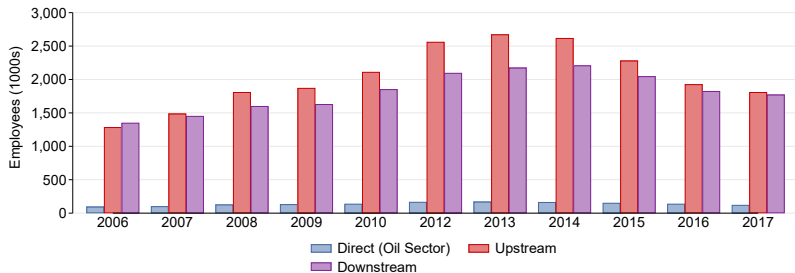
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 - > Search and matching costs (**Pissarides, 2014; Albrecht & Vroman, 2002**)
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- ▶ **Commodity-dependent countries** face higher sectoral volatility → more reallocation frictions

Global Oil Prices and Offshore Oil & Gas Discoveries in Brazil



► Petrobras Investment



► Identifying Upstream and Downstream Sectors Using Input-Output Table

► Oil-Linked Employment Growth Relative to Other Sectors

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 - > Accumulate knowledge in professional roles → job and occupation stability
 - > Later entrants compete with glut of new oil-specific graduates

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In the paper, we analyze **three types** of entrants into oil-linked sectors:

- ▶ **Experienced Workers**: workers who voluntarily leave a job and are rehired by a new firm within 4 months
- ▶ **New Hires**: workers hired into their first formal job, who can make education decisions based on anticipated sectoral dynamics
- ▶ **Unemployed/Informal Hires**: workers hired out of unemployment or the informal sector

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Strategy: Match workers **hired into an oil-linked establishment** in year t with counterfactual workers **hired into other sectors** in same year

Exact match on:

- ▶ **Demographics:** schooling, sex, race, age bin
- ▶ **Previous labor market experience:** establishment $(t - 1, t - 2)$, occupation category $(t - 1, t - 2)$, wage bin $(t - 1, t - 2)$
- ▶ **Destination municipality**

- ▶ Let E_{ic} be period when worker i in cohort c is treated by hire into oil. Let $K_{ict} = t - E_{ic}$ be number of years before or after event
- ▶ Let Y_{ict} be outcome for i in cohort c in year t
- ▶ Include worker and year fixed effects; cluster standard errors at worker level
- ▶ Control group = matched workers hired into other sectors in year t

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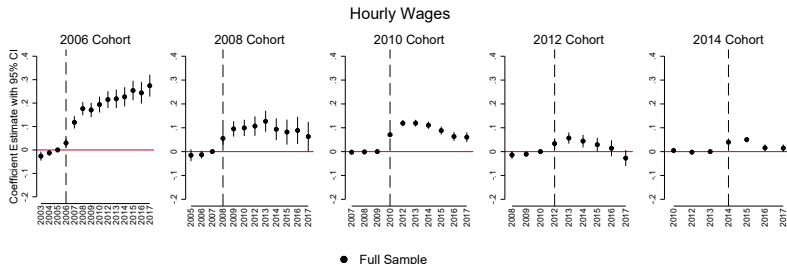
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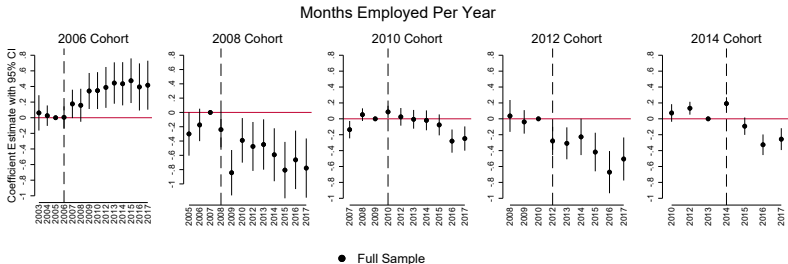
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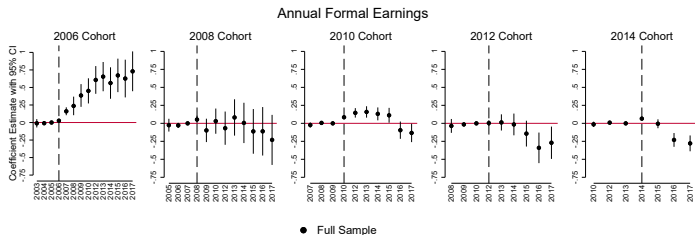
We're interested in **cohort-specific $\hat{\beta}_{ck}$'s** \Rightarrow estimate event studies separately for each cohort c relative to **matched controls**



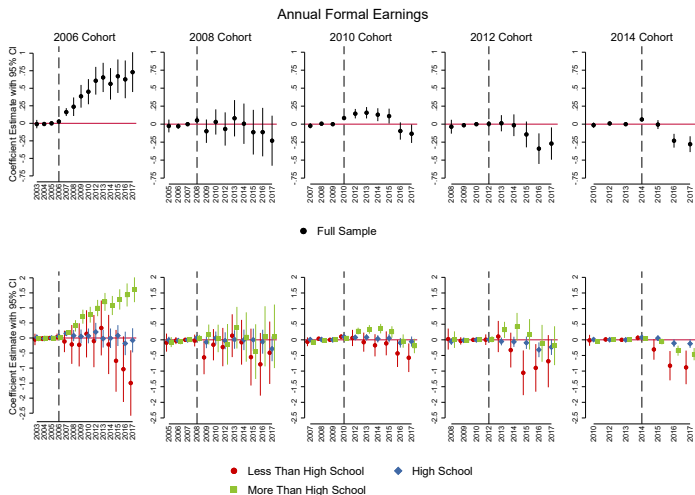
Note: Wages deflated to 2018 BRL and transformed using IHS. Standard errors clustered at individual level. **This specification keeps only employed individuals.**



Note: Months employed ranges from zero if worker never appeared in RAIS registry during a year, to 12 if individual was employed each month. **This specification keeps all treated individuals and matched controls (whether formally employed or not).**



Note: Annual earnings refers to total earnings across all formal jobs. Earnings are transformed using the IHS and deflated to 2018 BRL. **This specification keeps all treated individuals and matched controls, whether formally employed or not. In periods where individuals do not appear in panel, they are ascribed a value of zero formal earnings for this period.**



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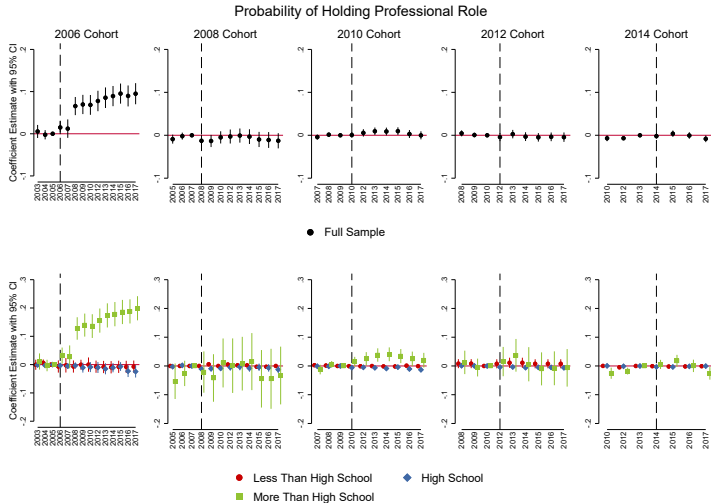
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- 4 Re-estimate preferred specification using **Callaway and Sant’Anna (2021)** estimator to account for heterogeneous treatment effects ▶ csdid
→ Effects are unchanged

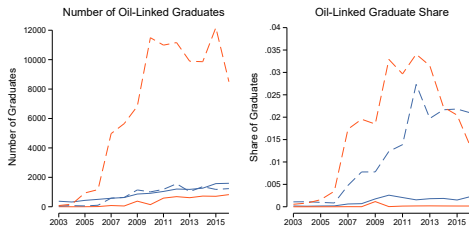


Note: Professional roles are defined as CBO occupations with codes beginning with 2. These roles are primarily described as “researcher,” “scientist,” “engineer,” “pilot,” “doctor,” “nurse,” “professor,” “lawyer,” and “analyst.”

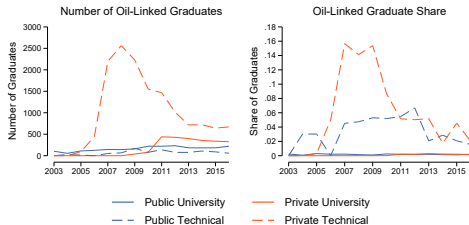
▶ [Managerial Roles](#) ▶ [Occupation Stability](#)

▶ Oil-Linked Degree Programs

Brazil



Rio de Janeiro



— Public University — Private University
- - Public Technical - - Private Technical

Note: Data are drawn from Brazil's annual Census of Higher Education.

- ▶ **Timing of entry relative to boom-bust cycle has lasting impacts on workers:** early entrants earn more than matched controls; later entrants suffer earnings and employment penalties
- ▶ **Boom-bust cycle generates inequality *between* and *within* cohorts:** high-ed workers earn more during booms and keep jobs during busts; low-ed workers are margin of adjustment for firms facing negative shocks
- ▶ **Oil boom provoked growth in sector-specific higher education** → more competition for later entrants
- ▶ **Broader Implications:** low-education workers are most vulnerable during transition away from fossil fuels; labor market benefits of renewables booms may accrue disproportionately to experienced early entrants

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Oil and Gas Sector	Leontief Coefficient
Oil and Gas Extraction and Support Activities	1.068
Top Upstream Sectors	
Legal, Accounting, and Consulting Services	0.055
Land Transportation of Cargo	0.039
Petroleum Refining and Coke Plants	0.032
Fabrication of Machines and Mechanical Equipment	0.027
Production of Pig Iron, Alloys, Steel, and Steel Pipes	0.023
Storage and Logistics	0.021
Construction	0.021
Maintenance, Repair, and Installation of Machines and Equipment	0.020
Architecture, Engineering, and R&D	0.018
Aquatic Transportation	0.017
Top Downstream Sectors	
Petroleum Refining and Coke Plants	0.411
Land Transportation of Cargo	0.088
Production of Organic and Inorganic Polymers and Resins	0.053
Electrical Energy and Utilities	0.047
Extraction of Non-Ferruginous Metals	0.045
Fabrication of Non-Metallic Mineral Products	0.029
Production and Refining of Sugar	0.029
Air Transportation	0.028
Production of Biofuels	0.027
Fabrication of Cellulose and Paper Products	0.026

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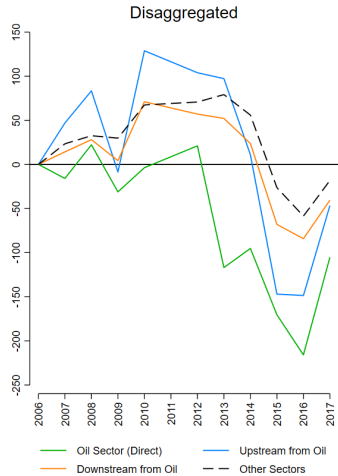
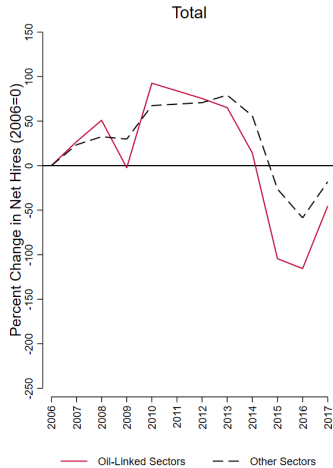
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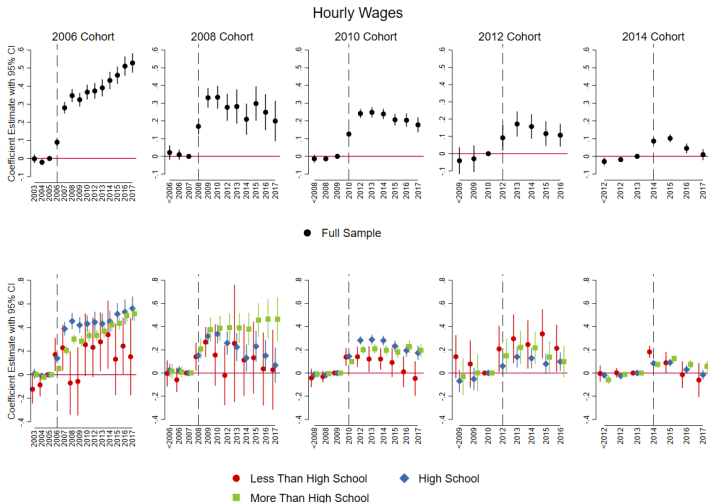
14 Directly-Linked, 109 Upstream, 31 Downstream Subclasses

[▶ Return](#)

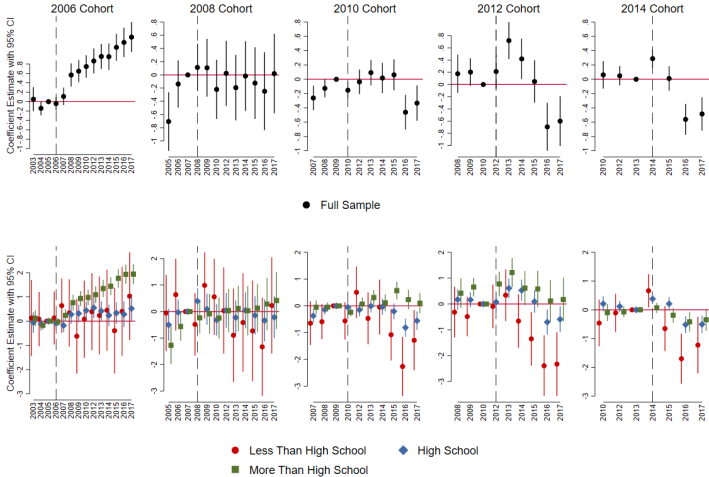


[Return](#)





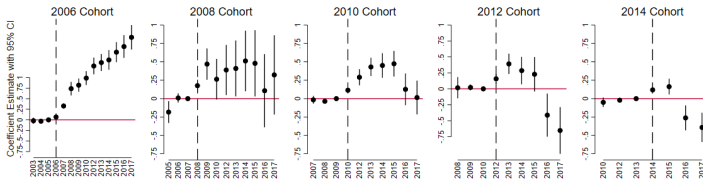
Months Employed Per Year



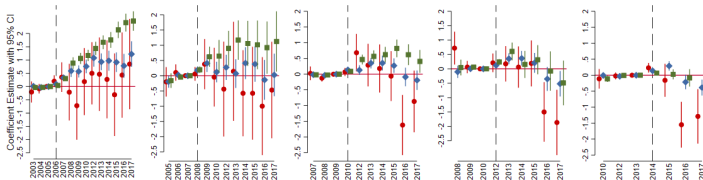
● Full Sample

- Less Than High School
- ◆ High School
- More Than High School

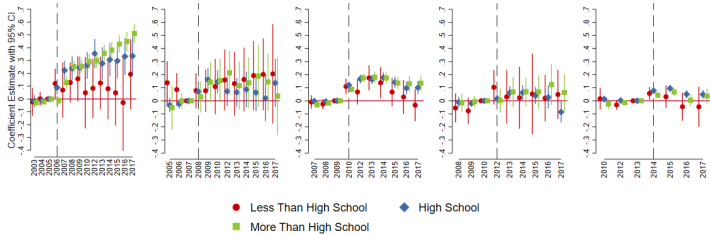
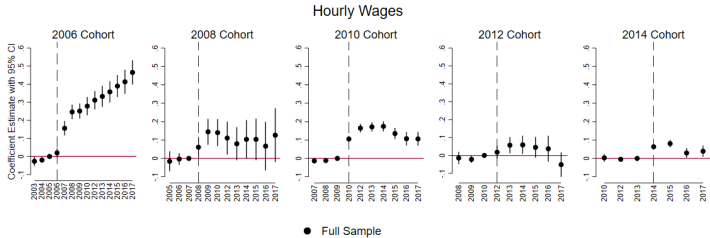
Annual Formal Earnings

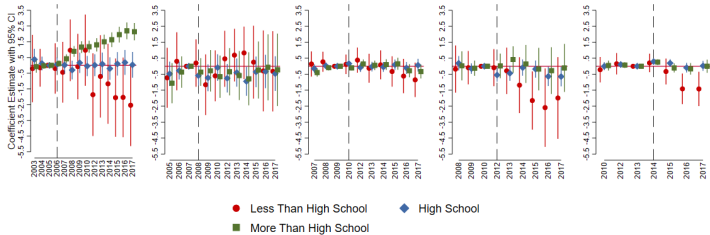
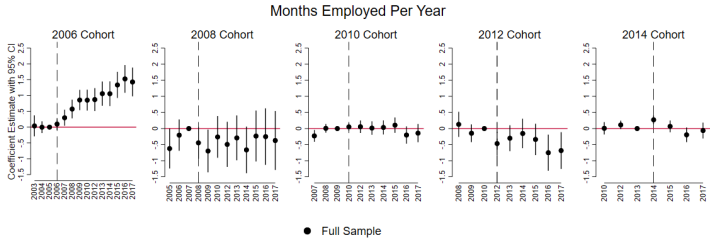


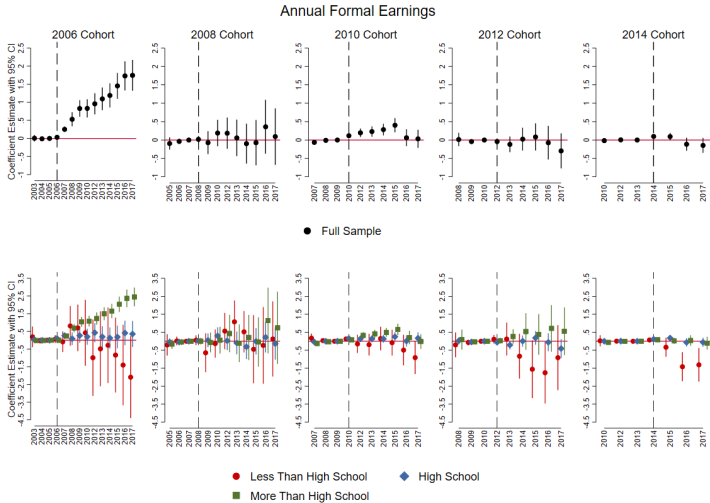
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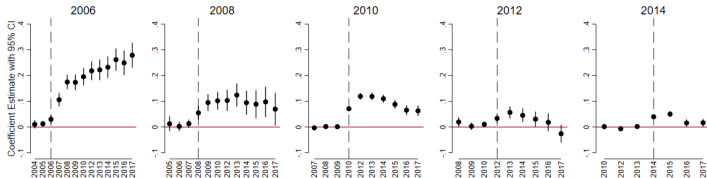
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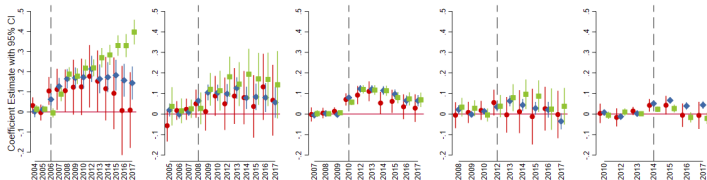




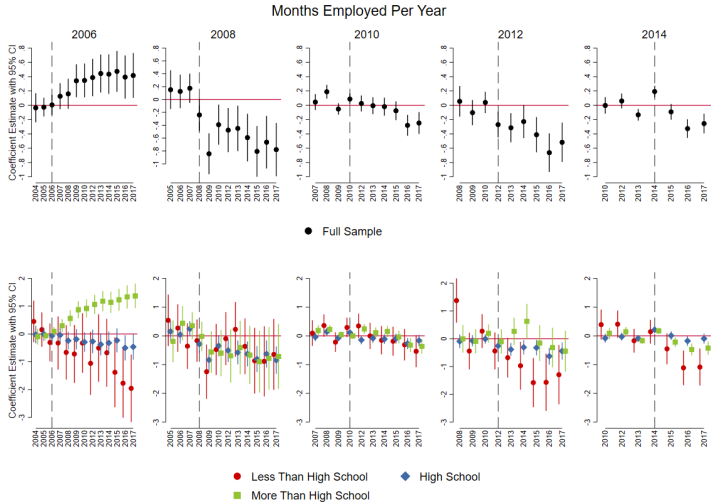
Hourly Wages



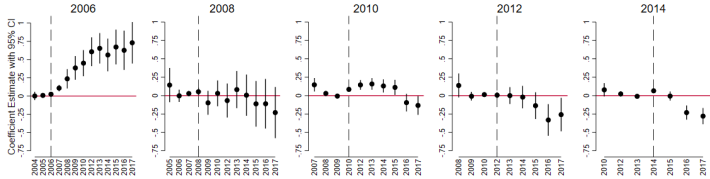
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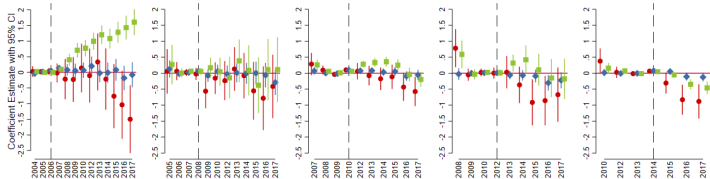
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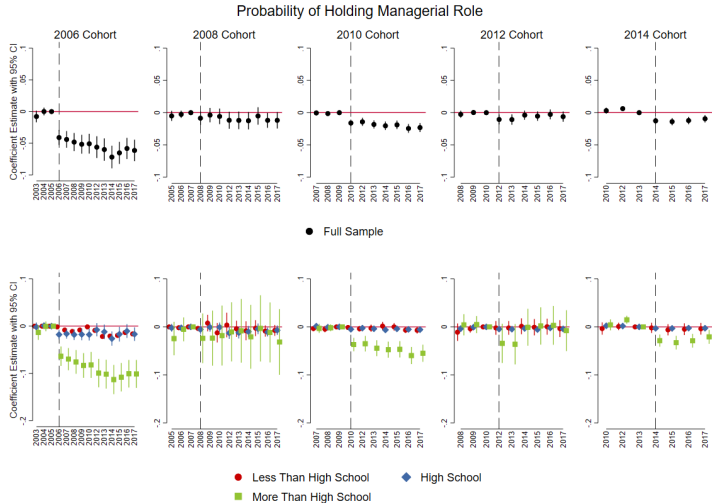
Annual Formal Earnings



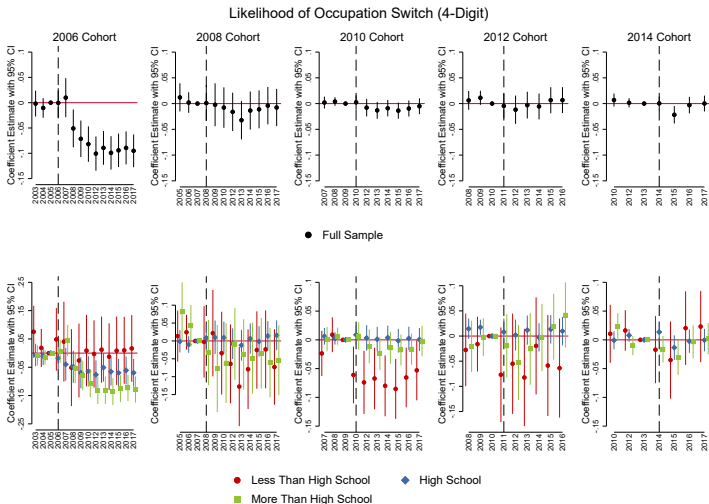
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Note: Managerial roles are defined as CBO occupations with codes beginning with 1. These roles are primarily described as “leader,” “director,” or “manager.”



Note: Outcome is a 0/1 indicator of whether the worker holds a different 4-digit CBO 2.0 Occupation Code from the one they were originally poached into.

Oil-Linked Majors (Narrow Definition)	
Petroleum Engineering	Environmental Management
Geological Engineering	Naval maintenance
Naval Engineering	Petrochemical Maintenance
Shipbuilding	Mining & Extraction
Shipbuilding (non-motorized)	Marine Navigation
Naval Construction	Operation of Ships
Environmental Control	Paleontology
Water Pollution Control	Petrology
Extraction of Petroleum & Gas	Processing of Petroleum & Petrochemicals
Geoscience	Petroleum Refining
Geophysics	Environmental Cleanup
Geology	Environmental Protection Technology

Disaggregate degree programs into:

- ▶ 4-Year and Technical
- ▶ Public and Private
- ▶ STEM and Other

▶ [Return](#)