

Analyzing State-Level Construction Fatality Rates, 1992-2016

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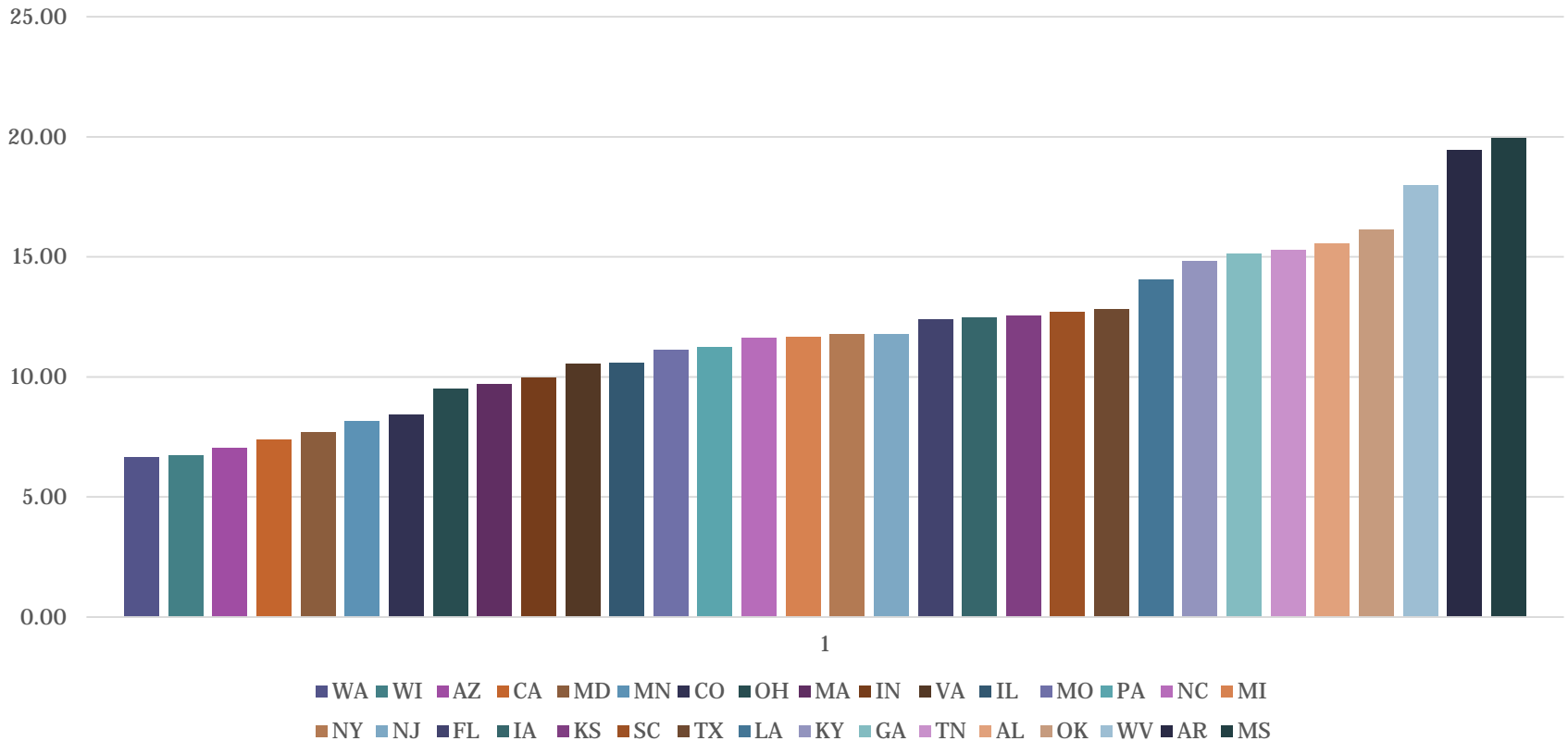
Acknowledgement

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Fatality Rates in Construction Vary 3-Fold Across States – 1992-2014

Fatality Rate per 100,000



Objectives of this Study

Construction fatality rates in the U.S. are higher than other sectors and vary 3-fold among states, although they have declined substantially over time.

Our research aims to explore these variations to try to learn about the impacts of public policies on fatality rates in construction.

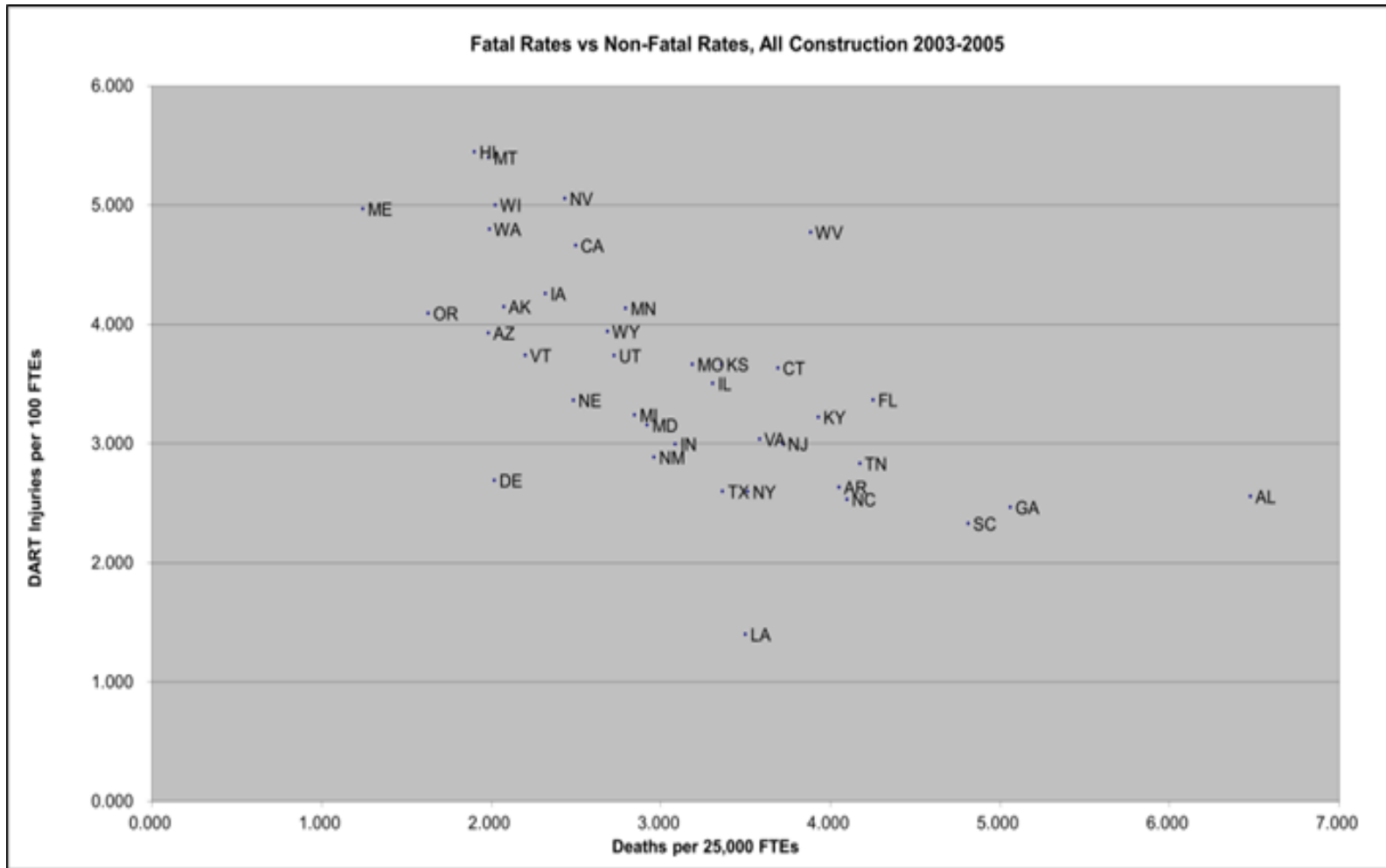
In particular, we examine policy variables

- OSHA enforcement activity
- State workers' compensation (WC) programs

Why Not Look at Non-fatal Injuries? They May Not Be Accurately Reported

- **SOII survey reports non-fatal work injuries**
 - **Dependent on employer reports**
 - **Reporting completeness may vary**
 - **Fatal and non-fatal rates are negatively correlated**
- **CFOI fatality reporting much more complete**
 - **but provides many fewer cases**

Negative Relation Between Fatal and Non-Fatal Rates Suggests Non-Fatal Under-Reporting



OSHA Inspections and Manufacturing Injuries

- **Prior work on OSHA inspections and injury data**
 - 10-15% reductions in non-fatal injuries over 2-3 years
 - Stable manufacturing workplaces
 - Name-and-address matching
- **Similar analysis in construction sector impossible**
 - Construction firms work at many sites each year
 - Injury rates reported for the whole firm
 - Can't link injuries to the inspected worksite

Outline

- 1) Describe our data set.
- 2) Describe initial analyses
- 3) Discuss federal OSHA vs. State Plans
- 4) Raise issues for discussion and further study

Our Data Set

- **Census of Fatal Occupational Injuries (CFOI)**
- **External CFOI dataset**
 - Annual deaths in construction sector
 - Data for 32 states for 1992-2014 = 736 obs
 - Excludes highway accidents, violence
 - Total deaths included=14,000
- **Internal CFOI microdata**
 - Data for all 50 states, 1992-2016 = 1,250 obs
 - More flexible analyses – different fatality types
 - Analyze sub-industries, demographic groups

Dependent variable = Fatality Rate

Fatality Rate= The number of deaths identified by CFOI among workers employed by firms in the construction industry (excluding highway accidents and violence – and self-employed) divided by the number of employees in the industry (rate per 100,000 workers).

Control Variables

- % Growth in Employment (QCEW)
- Average Weekly Wage (QCEW)
- % Employment in General Construction (QCEW)
- % Employment in Specialty Trades (QCEW)
- % Firms with less than 20 employees (QCEW)

- % Unionized (CPS)
- % Job Tenure < 3 yrs (January CPS)
- Pct of workers over 50 years old (CPS)
- Pct of workers who are foreign-born Hispanic (CPS)
- Pct of workers with at least high-school education (CPS)

Policy Variables

OSHA Enforcement

- OSHA (federal or state) inspections per 100 worksites
- Average penalty per inspection with any penalty
- Federal OSHA vs State-Plan states

Workers' Compensation

- Waiting Period in days (usually 3 or 7 days)
- WC Exemptions for small firms (e.g. < 5 workers)
- WC Premiums (% of payroll) cost
 - (Standardized across industry-occupation groups)

Impact of Control Variables on Fatality Rate (FR)

- **Weekly wage:** 20% higher wages = 1.2 lower FR
- **Education:** 10% more with HS degree = 2.1 lower FR
- **Employment growth:** 10% increase = 1.1 higher FR
- **Industry subsectors** (relative to Heavy Construction):
 - 5% more General Construction = 1.1 lower FR
 - 5% more Specialty Trades = 1.9 lower FR
- **Firm size:** 5% more small firms = 1.6 higher FR
- **Age:** 5% more over 50 = 0.6 higher FR
- **Ethnicity:** 10% more Hispanic = 0.9 lower FR

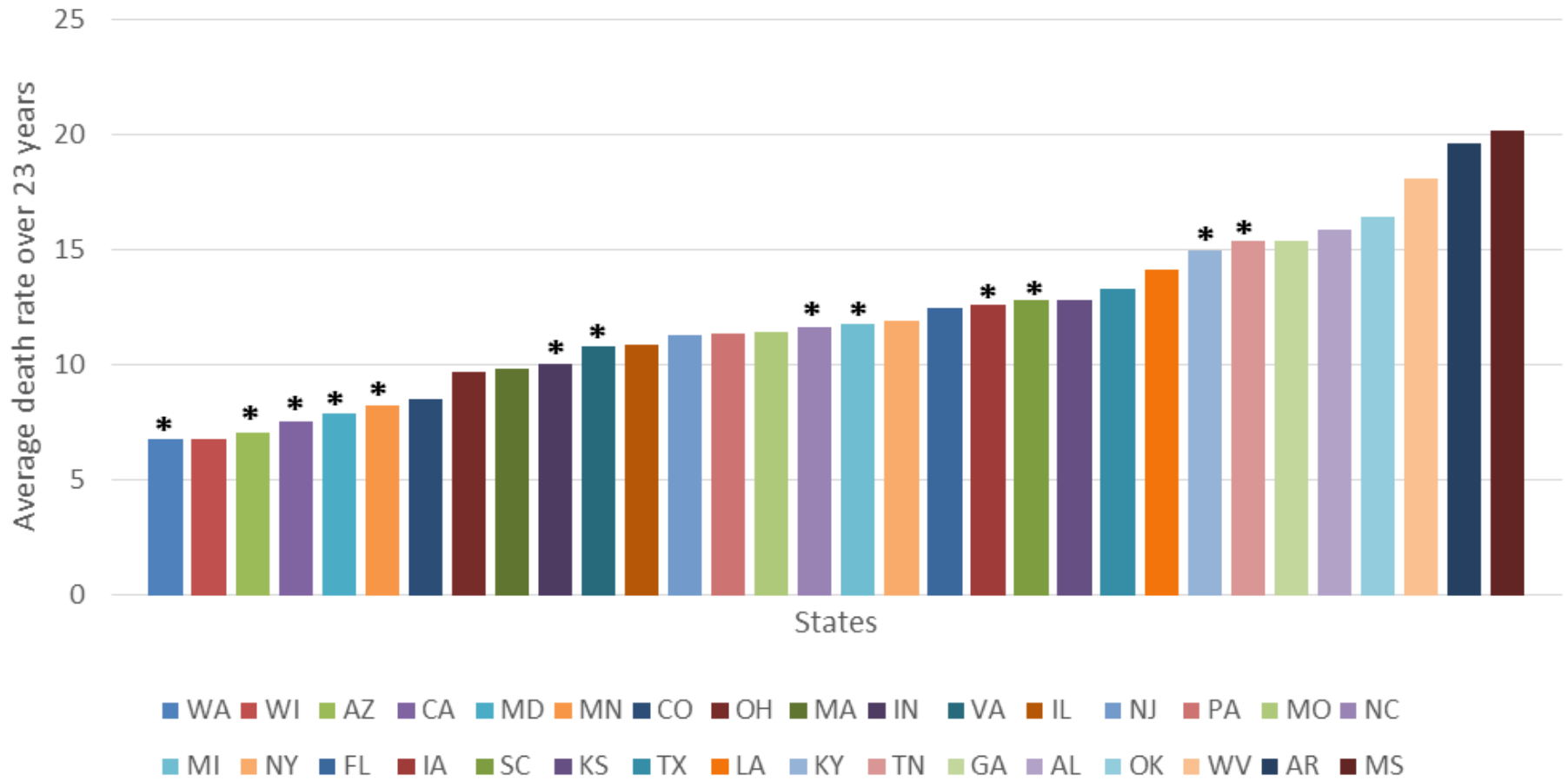
Impact of WC Variables on Fatality Rate (FR)

- **Waiting Period:** 3 days rather than 7 days reduces FR by 1.0, about 8% of mean
- **WC exemptions for small firms:** having exemption increases FR by 0.9, about 8% of mean
 - Effect increases with size of exemption (exempting <5 has bigger effect than exempting <3).
- Don't know whether these relationships are due to the specific WC rules or other aspects of state WC policy (or other factors)

Impact of OSHA Variables on Fatality Rate (FR)

- **Inspection Rate:** inspecting 9% instead of 6% of worksites reduces FR by 0.4, about 3% of mean
- **Penalty per Inspection:** average \$1000 higher increases FR by 0.6, about 5% of mean

Rates in State-Plan States Are Lower



* = state-plan state

Impact of OSHA Variables on Fatality Rate

- **Federal OSHA vs State-plan states**
 - State-plan FRs significantly lower than federal
- Unclear at this point whether differences between federal and state plan states are due to:
 - Different inspection practices
 - Other practices not captured here
 - Long-standing differences that pre-date OSHA

Generate Expected Fatality Rates

- Re-run regression with only control variables
 - (eliminating OSHA and WC policy variables)
- Explains about 40% of variation in fatality rates
- Similar coefficients to original model

- Get expected fatality rate for each state
- Compare actual to expected fatality rates
- Which states are higher/lower than expected?

Actual Fatality Rate vs. Expected Rate

Lower than Expected

WI	-33%
WA*	-31%
MN*	-20%
NC*	-19%
VA*	-17%
CA*	-16%
MD*	-15%
SC*	-14%
LA	-13%
CO	-13%
IN*	-11%

Similar to Expected

OH	-9%
AZ*	-7%
KY*	-1%
TX	0%
KS	+1%
IA*	+1%
PA	+2%
FL	+5%
WV	+5%
MO	+6%
OK	+8%

Higher than Expected

MA	+10%
AL	+10%
MS	+15%
TN*	+15%
GA	+16%
IL	+17%
NJ	+17%
AR	+21%
MI*	+23%
NY	+28%

$(\text{Actual FR} - \text{Expected FR}) / \text{Expected FR}$

*=State-plan states

Observations on State Rankings

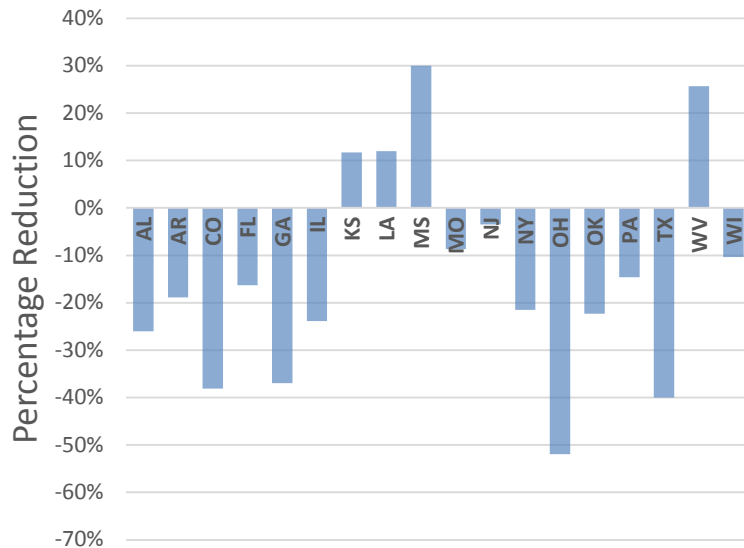
- **State plan states do better than federal**
- **Fatality rates tend to vary with expectations**
- **There are some exceptions**
 - **LA - high fatality rate, lower than expected**
 - **NY, MI – moderate FR, much higher than expected**
 - **Possibly more high-rise construction or more urban?**

Have State Plan Rates Always Been Low?

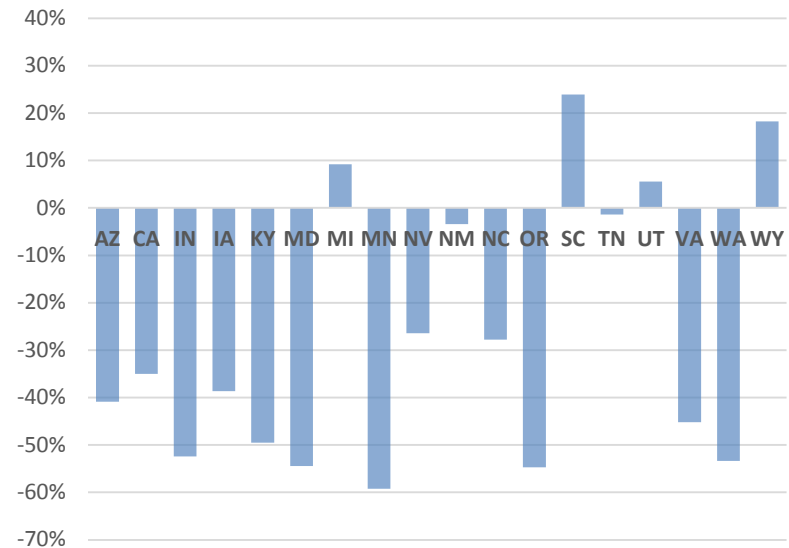
- **We test for differences in fatality rate trends**
 - **National Traumatic Occupational Fatalities data**
 - **Changes from 1983-85 to 1993-95**
 - **Compare 18 state plan and 18 federal states**

Construction Fatality Rates Declined More in State Plan States from 1983-85 to 1993-95

Federal OSHA States



State Plan States



Preliminary Policy Results

- OSHA enforcement
 - More frequent inspections link to lower fatality rates
 - Magnitude of effect is small
 - Higher penalties link to higher fatality rates.
- Workers' compensation
 - Shorter WC waiting periods link to lower fatality rates
 - Magnitude of effect is small
 - Exempting small firms links to higher fatality rates
- Are other WC characteristics important?
- Reverse causality (more hazards -> higher penalties)?

More Remains to Be Done

Differences in background factors (like wages and education) may explain some of the variation in fatality rates.

So far, our measures of policy variables explain a small amount of additional variation.

There remains a sizable amount still to explain.

Questions and Plans

- Looking at sub-industries and types of work
- Examining OSHA fatality inspection data
- Working with NCCI to identify incentive effects of WC more closely
- Surveying states about special features of their OSHA and WC programs
- Understanding fatality rates for self-employed
- We welcome comments and suggestions.
- Let us know if you would like to receive updates.

The End



Additional Material

Construction Fatality Rates per 100k Have Declined (32 states, employees only, without highway, violence)

