Effects of State Payroll Subsidies of Varying Design: Evidence from Nursing Homes

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Introduction

- Over half of all state Medicaid programs adopted a nursing home payroll subsidy of some kind in the late 1990s and early 2000s
  - Subsidies adopted varied widely in design
  - Many subsidies from this era are still in place
- Question 1: Are nursing home payroll subsidies effective at increasing nursing home staffing levels?
- Question 2: Which subsidy designs are most effective?
- Today, will focus on comparing subsidy regimes in Florida and Maine

Motivation

- Medicaid covers 62% of America's 1.3 million nursing home residents, but struggles to ensure its enrollees receive high quality care
- Nursing home staffing levels are a proxy for nursing home care quality
  - Nursing home care is very labor intensive
  - Labor comprises two-thirds of nursing home costs
- Payroll subsidies may be an effective way to improve care quality for Medicaid nursing home residents
- Nursing home payroll subsidies can be informative for the broader payroll subsidy literature
  - Payroll subsidy literature is limited by lack of clean policy variation
  - Payroll subsidy literature has limited variation in payroll subsidy design

Payroll Subsidy Mechanisms

- Subsidy mechanism 1: The substitution effect
  - The effect of reducing a nursing home's marginal cost of hiring
- Subsidy mechanism 2: Scale effects
  - The effect of a nursing home receiving more resources
- Why might scale effects matter?
  - Altruistic motives to increase quality
  - Credit constraints
  - States generally threaten clawbacks if subsidies do not appear to have been spent on labor
- Different states' subsidy regimes emphasize different mechanisms

Payroll Subsidy Features Common Across States

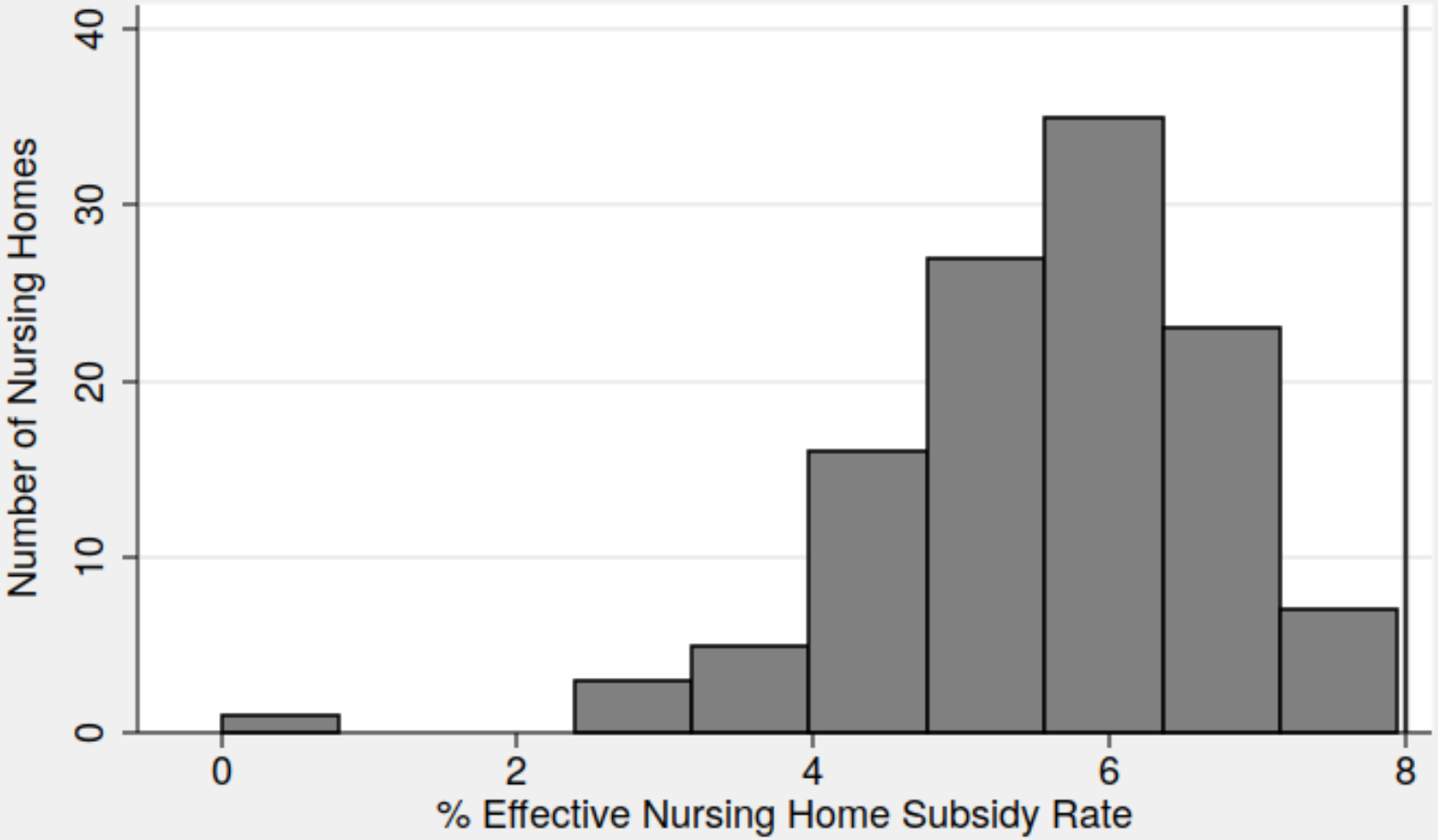
- Subsidies available only for portion of payroll spent on direct care workers (nurses and nursing assistants)
- Subsidies awarded depending on overall nursing home staffing ratios or payroll per resident, but paid on a per Medicaid resident basis
  - Increasing your per Medicaid resident subsidy requires increasing staffing for all residents
- Logic behind this: Nursing homes cannot offer different care quality levels to Medicaid and non-Medicaid residents
  - Grabowski et al 2008 find nursing homes comply with this requirement
- Effective subsidy rates faced by nursing homes are their per Medicaid resident subsidy rate scaled by their share of residents on Medicaid

Today's Topic: Payroll Subsidies in Maine and Florida

- Focus on effect of nursing home payroll subsidies adopted in Maine and Florida
  - These states' policy regimes had some particularly distinctive features
- Focus on results obtained using a within-state identification strategy exploiting variation in subsidy rates faced by nursing homes within Maine and Florida
- Focus on staffing ratios as outcome of interest

Maine's Nursing Home Payroll Subsidy

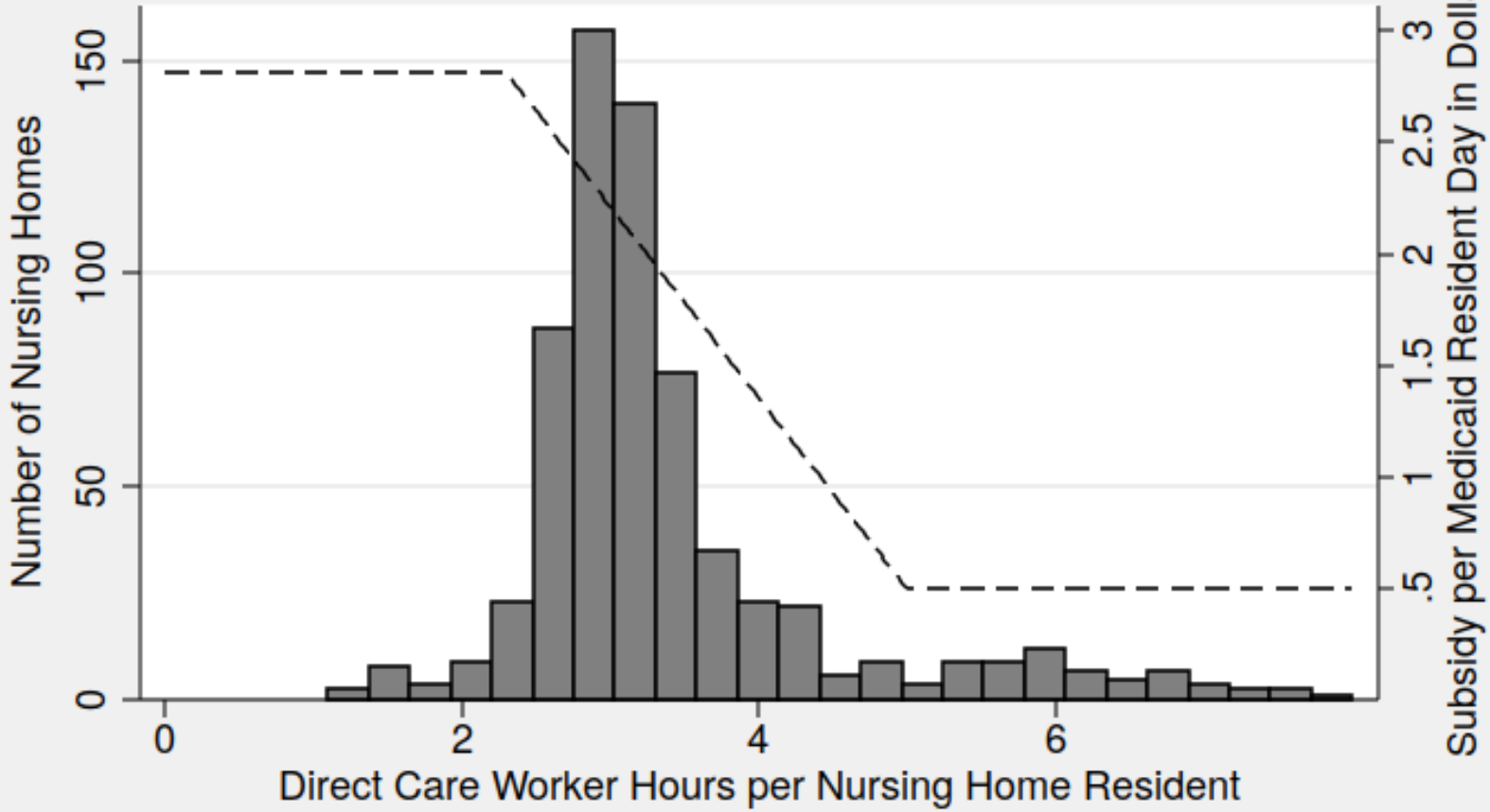
- Fixed pool of $10.4 million in subsidies available each year from 2003-2010
- Nursing homes received a share of total subsidy pool equal to their share of total Medicaid allowed direct care worker payroll
  - Medicaid allowed direct care worker payroll is essentially direct care worker payroll scaled by each nursing home's Medicaid share
  - For firms with high payroll per resident, further payroll spending per resident might not increase allowed direct care worker payroll
- Subsidy rate of approximately 8% of direct care worker payroll for an all Medicaid nursing home in 2003
- Positive substitution and scale effects of equal magnitude for most firms with identical Medicaid shares



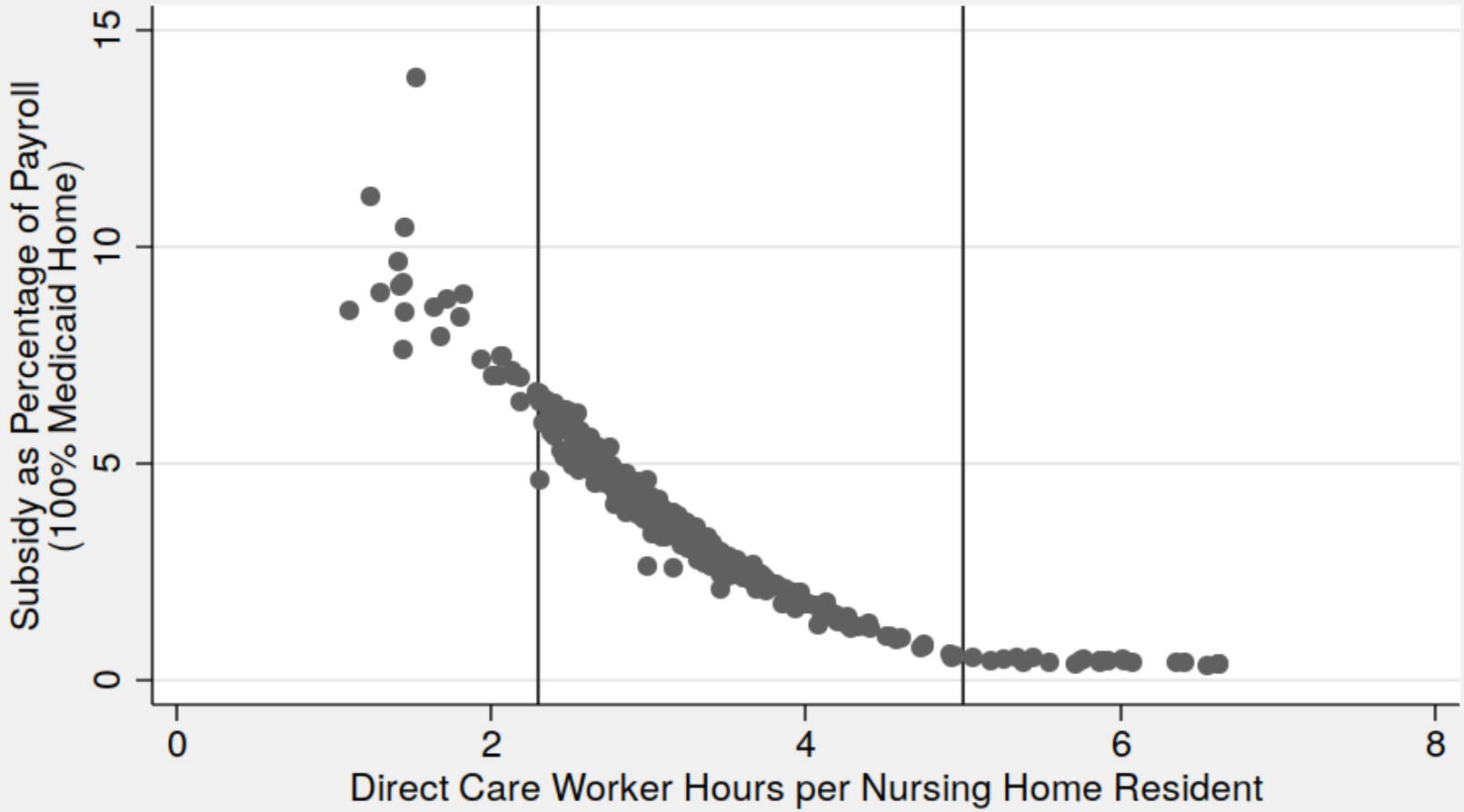
Effective subsidy rates depend on a nursing home's share of residents on Medicaid and its total direct care worker payroll costs, subject to some adjustments. Rates shown are estimates based off of nursing homes' 2002 pre-subsidy characteristics and Maine average labor costs by worker type. The subsidy rate for a Medicaid only nursing home, 8%, is highlighted with a vertical line.

Florida's Nursing Home Payroll Subsidy

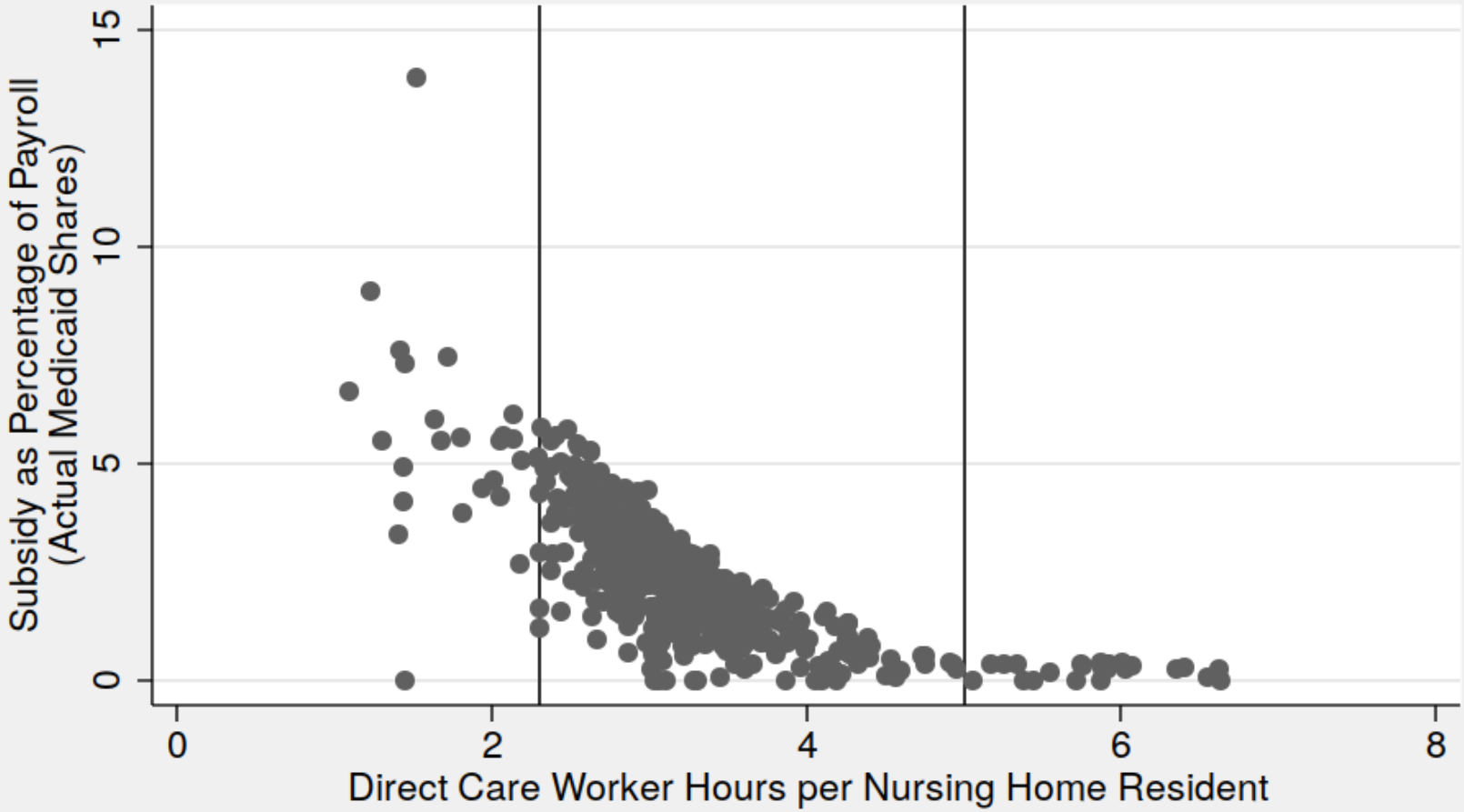
- Fixed pool of subsidies available each year from 2000-2001
- Subsidy payments depended on nursing home staffing levels
  - Measured in terms of direct care worker hours per resident, treating nurse and nursing assistant hours equally
- Nursing homes with ≥ 5 hours per resident received \$0.50 per Medicaid resident per day; homes with ≤ 2.3 hours received \$2.81
- Subsidies scaled linearly between \$2.81 and \$0.50 for staffing ratios between 2.3 and 5 hours
- Scale effects were largest for low staffing nursing homes
- Some nursing homes faced negative substitution effects



Distribution of nursing homes is given using 1999 pre-subsidy characteristics. The maximum subsidy shown, $2.81, was not directly specified by law, but rather was determined as a consequence of the actual staffing levels achieved by nursing homes and by the total appropriation made for the subsidy regime as a whole.



Vertical lines demarcate subsidy schedule regions.
Nursing homes are shown with 1999 pre-subsidy characteristics.
Share of payroll figures are estimates based on average statewide costs by worker type.



Vertical lines demarcate subsidy schedule regions.
Nursing homes are shown with 1999 pre-subsidy characteristics.
Share of payroll figures are estimates based on average statewide costs by worker type.

Data

- Data consists of annual observations of individual nursing homes in the United States from 1996 to 2015
- Data was collected by state Medicaid program censuses of nursing homes using a single national survey instrument
  - Data obtained from Long Term Care Focus, the Cowles Research Group
- Key variables: Nursing home staffing ratios in terms of direct care worker hours per nursing home resident and share of nursing home residents on Medicaid
- Before use in analysis, data was cleaned to fix decimal point misplacements and nursing homes with incorrect identifier changes
- Nursing homes reporting implausibly large staffing levels or resident counts were dropped

Empirical Strategy: Maine

- Goal: identify effect of subsidies on nursing home staffing ratios
- Approach: compare nursing homes facing different subsidy rates in Maine when subsidies are available between 2003 and 2010 relative to before and after
- Variation in subsidy rates is due to variation in nursing home resident Medicaid shares, which may be endogenous to the subsidy
  - Instrument for Medicaid shares using pre-subsidy Medicaid shares
- Cluster standard errors at nursing home level
- Weight nursing homes by resident counts, Medicaid resident counts

Empirical Strategy: Maine

$$MRD_{i,t} = \beta_1 * Medicaid\ Share_{i,t} * Policy in Place_t + \mu_i + \eta_t$$

- i indexes nursing homes while t indexes years from 1996 to 2015
- μ_i is a nursing home fixed effect while η_t is a year fixed effect
- $MRD_{i,t}$ is nursing home i's number of minutes of direct care worker time per nursing home resident per day in year t
  - Also break out results by nurses and nursing assistants
- $Medicaid\ Share_{i,t}$ the share of nursing home i's residents on Medicaid in year t
- $Policy in Place_t$ is a dummy variable that is 1 in 2003 - 2010 and 0 otherwise

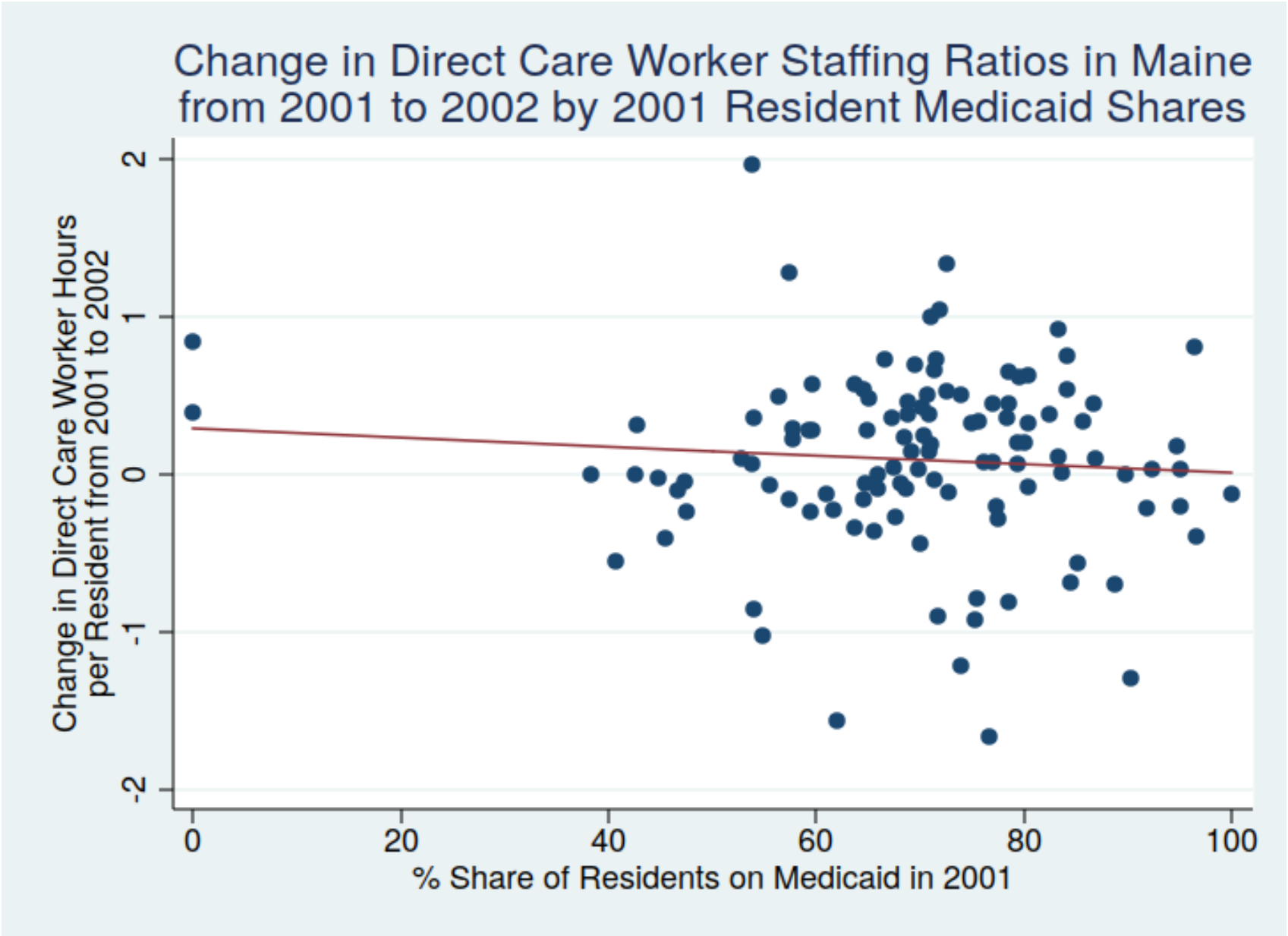
Empirical Strategy: Maine

$$MRD_{i,t} = \beta_1 * Medicaid\ Share_{i,t} * Policy in Place_t + \mu_i + \eta_t$$

- β_1 gives the effect on $MRD_{i,t}$ of a 1 percentage point increase in a nursing home's Medicaid share when the policy is in place
  - A 1 percentage point increase in Medicaid share increases the total subsidy as a proportion of payroll by about 0.08 percentage points
  - Presumably, this has a positive effect on staffing ratios
- Note: first stage regressions instrument $Medicaid\ Share_{i,t}$ interactions using $Prior\ Medicaid\ Share_i$, which is each nursing home's average Medicaid share in the 4 years prior to subsidy passage

Empirical Strategy Assumptions

- Assumption 1: No differential trends by Medicaid resident shares
  - Will present evidence on this point
- Assumption 2: No labor supply constraints
  - If more subsidized nursing homes hire workers away from less subsidized homes, effect of subsidies on subsidized homes will be overstated
- Assumption 3: No competitive spillovers
  - If more subsidized nursing homes raise staffing levels and less subsidized homes increase staffing to remain competitive, effect of subsidies on subsidized homes will be understated


Change in Direct Care Worker Staffing Ratios in Maine
from 2001 to 2002 by 2001 Resident Medicaid Shares
Change in Direct Care Worker Hours
per Resident from 2001 to 2002
2
1
0
-1
-2
0
20
40
60
80
100
% Share of Residents on Medicaid in 2001

Maine Results

	Resident Weights	MCD Res Weights	Unweighted
Direct Care Worker Minutes			
Treatment	0.616*	0.755*	0.334
	(0.287)	(0.303)	(0.266)
Nursing Assistant Minutes			
Treatment	0.416	0.539*	0.102
	(0.255)	(0.271)	(0.231)
Nurse Minutes			
Treatment	0.200*	0.216*	0.233**
	(0.0853)	(0.0901)	(0.0886)
N	2063	2053	2166
FE	Home, Year	Home, Year	Home, Year

Nursing home clustered SEs in parentheses, + p$\leq$ 0.1, * p$\leq$ 0.05, ** p$\leq$ 0.01
All outcome variables are given in terms of worker minutes per resident.
Each estimate in the table is from a separate regression with a different outcome variable or weighting scheme.

Maine Results

- Mean nursing home in Maine had 68% of its residents on Medicaid from 2003 - 2010
- Average nursing home resident in nursing home with average Medicaid share saw 42 minute increase in direct care worker time per resident
- Average nursing home with average Medicaid share saw a (statistically insignificant) 23 minute effect on direct care worker time per resident
- Effect on nurse staffing at the mean was 13.6 - 15.6 minutes per resident, however weighted

Empirical Strategy: Florida

- Goal: identify effect of subsidies on nursing home staffing ratios
- Approach: compare changes in staffing ratios when subsidies are introduced in 2000 and 2001 across nursing homes facing different subsidy rates due to variation in nursing home Medicaid shares
  - Compare only 2000-2001 to 1996-1999 (other policies change in 2002)
  - Instrument for 2000-2001 Medicaid shares using each nursing home's average 1996-1999 Medicaid share

Empirical Strategy: Florida

- Allow these effects to vary by a nursing home's location on each of the three parts of the subsidy schedule
  - Regions: $\leq$ 2.3 hours, 2.3 - 5 hours, $\geq$ 5 hours
  - These splits divide the subsidy region by substitution effect sign
  - Assign nursing homes into these regions on basis of pre-subsidy staffing levels
- Cluster standard errors by nursing homes
- Weight nursing homes by resident counts

Empirical Strategy: Florida

$$\begin{aligned} MRD_{i,t} = \ & \beta_1 * Medicaid\ Share_{i,t} * Policy_t * Low_i + \\ & \beta_2 * Medicaid\ Share_{i,t} * Policy_t * Medium_i + \\ & \beta_3 * Medicaid\ Share_{i,t} * Policy_t * High_i + \mu_i + \eta_t \end{aligned}$$

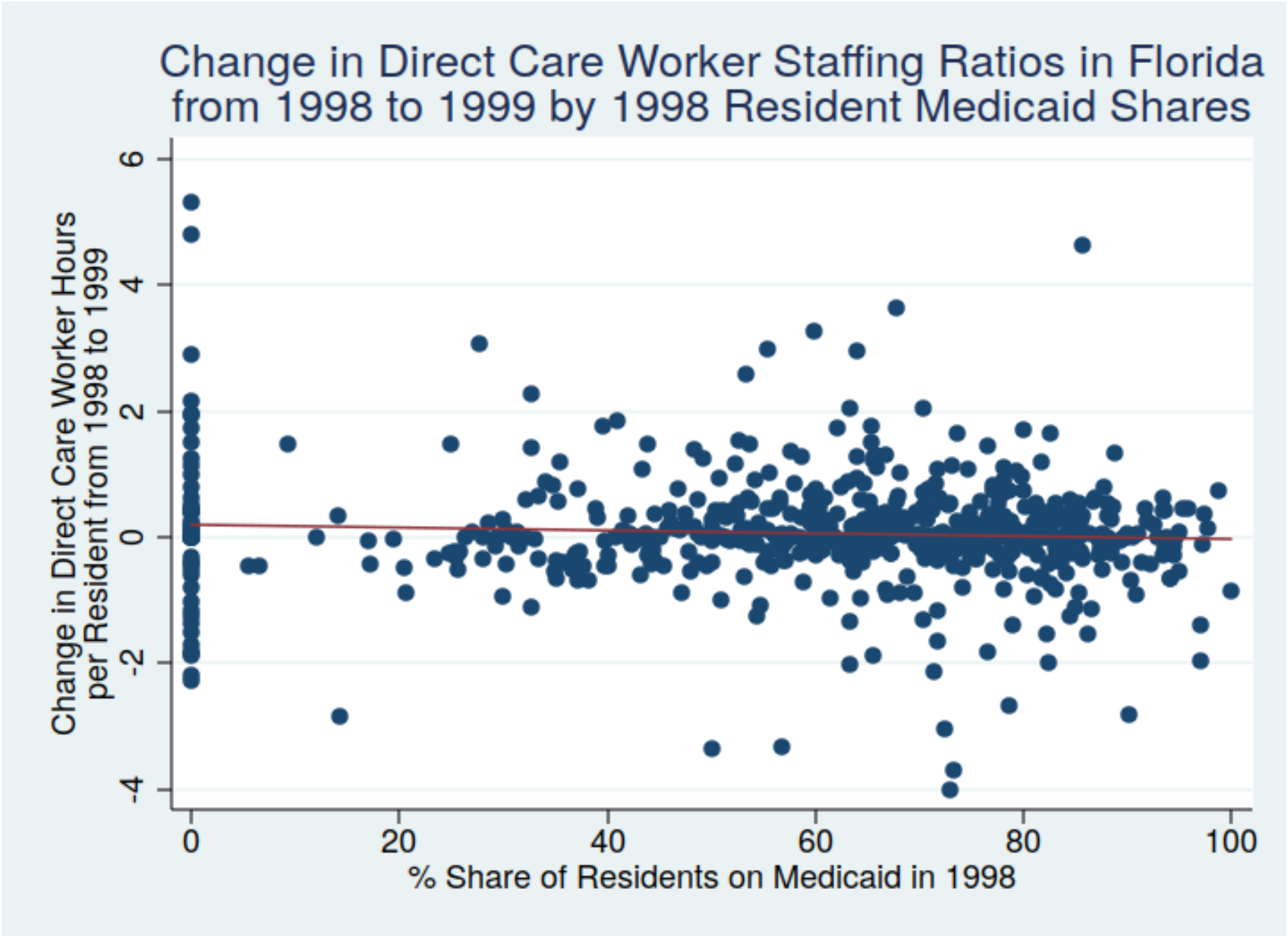
- i indexes nursing homes while t indexes years from 1996 to 2001
- μ_i is a nursing home fixed effect while η_t is a year fixed effect
- $MRD_{i,t}$ is nursing home i's number of minutes of direct care worker time per nursing home resident per day in year t
  - Also break out by nurse and nursing assistant minutes
- $Medicaid\ Share_{i,t}$ is nursing home i's Medicaid share in year t

Empirical Strategy: Florida

- $Policy_t$ is a dummy variable that is 1 in 2000-2001 and 0 before
- Low_i, $Medium_i$, and $High_i$ are dummy variables for whether a nursing home's average 1996-1999 staffing ratio was ≤ 2.3, between 2.3 and 2.5, or ≥ 5 hours per resident
- β_1 gives the effect on $MRD_{i,t}$ of a 1 percentage point increase in a nursing home's Medicaid share when subsidies are introduced for homes with staffing under 2.3 hours per resident
  - A 1 percentage point increase in Medicaid share increases the subsidy per resident by 2.8 cents
  - If scale effects are positive, this has a positive effect on staffing ratio

Empirical Strategy: Florida

- β_2 is comparable to β_1 but for nursing homes with staffing between 2.3 and 5 hours per resident
  - These nursing homes face negative substitution effects and smaller subsidies, so presumably β_2 should be smaller than β_1
- β_3 is comparable to β_1 but for nursing homes with ≥ 5 hours per resident
  - Much smaller subsidy size for these firms, no substitution effect
- Note: first stage regressions instrument *Medicaid Share*$_{i,t}$ interactions using *Prior Medicaid Share*$_i$, the nursing home specific average Medicaid share from 1999-1999


Change in Direct Care Worker Staffing Ratios in Florida
from 1998 to 1999 by 1998 Resident Medicaid Shares
Change in Direct Care Worker Hours
per Resident from 1998 to 1999
6
4
2
0
-2
-4
0
20
40
60
80
100
% Share of Residents on Medicaid in 1998

Florida Results

	Resident Weights	MCD Res Weights	Unweighted
DCW Minutes			
Low Hours (β_1)	1.035**	1.174**	0.970**
	(0.201)	(0.203)	(0.170)
Medium Hours (β_2)	0.159	0.322**	0.0604
	(0.111)	(0.116)	(0.106)
High Hours (β_3)	-1.757**	-1.574**	-2.067**
	(0.384)	(0.339)	(0.324)
Aide Minutes			
Low Hours (β_1)	0.602**	0.693**	0.578**
	(0.144)	(0.152)	(0.117)
Medium Hours (β_2)	-0.0373	0.0712	-0.113
	(0.0650)	(0.0799)	(0.0688)
High Hours (β_3)	-1.098**	-0.951**	-1.325**
	(0.252)	(0.223)	(0.247)
Nurse Minutes			
Low Hours (β_1)	0.433**	0.482**	0.392**
	(0.0860)	(0.0813)	(0.0833)
Medium Hours (β_2)	0.196**	0.251**	0.173*
	(0.0723)	(0.0662)	(0.0711)
High Hours (β_3)	-0.660*	-0.624*	-0.743**
	(0.261)	(0.260)	(0.257)
N	3519	3250	3568
FE	Home, Year	Home, Year	Home, Year

Florida Results

- 62% of residents in mean 2000-2001 FL nursing home on Medicaid
- Nursing homes with low staffing ($\leq$ 2.3 hours per resident) increased total staffing by about 1 hour at the mean, regardless of weighting
- Nursing homes with staffing between 2.3 and 5 hours per resident saw smaller, mostly statistically insignificant changes
  - Composed out of 0 effect on nursing assistant staffing and an approximately 13 minute per resident effect on nurse staffing
  - Consistent with firms facing negative substitution effects preferring to spend subsidies on nurses due to their smaller contribution to staffing ratios per dollar of payroll expenditure
- Nursing homes with initially high staffing ($\geq$ 5 hours per resident) saw total staffing *reductions* of 38 minutes at the mean

Florida Results

- Concern: Regression to the mean by staffing ratio categories
- If high Medicaid nursing homes are more likely than low Medicaid homes to have staffing ratios over 5 hours per resident because of transitory shocks, regression to the mean may bias β_3 downward
- If low Medicaid nursing homes are more likely than high Medicaid homes to have staffing ratios under 2.3 hours per resident because of transitory shocks, regression to the mean may bias β_1 downward
- Currently not correcting for this, but working on implementing solutions from the tax literature

Conclusion

- Nursing home payroll subsidies can substantially increase nursing home staffing levels
- Both scale and substitution effects matter
  - Firms also seem to respond to incentives to favor one type of worker over another
- Nursing homes payroll subsidies potentially have large implications for nursing home resident welfare
- Availability of across-state variation in payroll subsidy adoption and design uniquely valuable for the payroll subsidy literature

Ongoing Work

- Extend analysis to include subsidies in all states under single framework
- Examine heterogeneous effects by labor market and nursing home market competitiveness
- Examine heterogeneous effects by for-profit status
- Extend analysis to identify effects of subsidies using both within-state and across-state identification strategies