Producing quality child care for young children: Do we know the recipe?

Gordon Cleveland
Department of Management,
University of Toronto Scarborough
(Joint work with Douglas Hyatt, Rotman School, U of T)
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Basic idea

- Use data from classrooms in child care centres - statistically estimate factors that affect quality and how much for each
- Need data on output (quality) and many inputs

Why does it matter?

- Use of nonparental care is normative. Quality matters to child development, but is mediocre now
- Want to produce quality efficiently; determine tradeoffs
- Affects design of regulation and subsidization

Basic Model

- Production function for child care quality – technological relationship, but…
- Output is difficult to measure
- Clients affect productivity
- Inputs are heterogeneous

Estimation Difficulties

- Estimating a causal relationship
- How do we handle e.g., wages
- Omitted inputs may be correlated with included inputs
- Many unobservables (because of heterogeneity of inputs) = omitted variables

Previous studies (4 groups)

- Iron triangle: NDCS (Ruopp et al., 1979): staff/child ratio, group size, ECE training of staff
  - Group size clearest, ECE training esp for preschool, experience does not matter. S/C ratio matters especially for infants.
  - Good summary up to 1990 in Hayes et al.(1990). Small samples, correlations.
- Wages: (1990's)wages paid to caregivers have been ignored; other factors overemphasized (Phillips et al., 2000)

More studies

- NICHD: across settings – father, grandparent, in-home, family home, centres (using ORCE)
  - At 12/15/24 months, group size, child-adult ratio, non-authoritarian beliefs, orderly learning environment
  - At 36 months, caregiver's education, experience and beliefs
- Blau (1997, 2000): inadequate controls for observable and unobservable inputs = biased results. Regulatable inputs do not matter when estimation is done correctly (centre fixed-effects model)

The contribution of this paper

- Canadian data and classroom measure of quality in rich data set
- Many inputs and proxy measure for unobserved teacher quality
- Estimates of the quantitative contribution of various inputs to child care quality
- Argument that centre fixed-effects model is inappropriate

What is quality?

- Structural quality
- Process quality
- Child development outcomes
- ITERS/ECERS
- CIS (Caregiver Interaction Scale)

Features of ITERS/ECERS

- Process quality - global measures of child care environments and interactions; scored by trained observers; classroom-based
- include:
  - space, furnishings and materials
  - personal care routines
  - language-reasoning
  - learning activities
  - caregiver-child interaction
  - program structure
  - parent and staff needs
- scored on scale of 1 to 7 points

Caregiver Interaction Scale (Arnett's CIS)

- SENSITIVE
  - speaks warmly to children
  - listens attentively when children speak to her
  - seems to enjoy the children
  - explains reasons for discipline
  - encourages children to try new experiences
  - seems enthusiastic about children's activities and efforts
  - pays positive attention to children as individuals
  - talks to children on a level they can understand
  - encourages children to exhibit prosocial behaviour
  - kneels, sits or bends when talking to children
- Measured on 4 point scale with 1 = not at all and 4 = very much

What is our model of the production of quality?

- Various inputs can be combined to produce different levels of quality of child care
- Key inputs are:
  - structural features (staff-child ratio, group size, caregiver education/training)
  - other teacher characteristics
  - centre-specific characteristics
  - characteristics of children receiving care
  - error term (random unobservables, measurement error)

Production of quality

- Inputs are combined according to:

  $Q_{im} = f(X_{im}, Z_i) + e_{im} + u_i$

- where

  - X are classroom-specific variables
  - Z are centre-specific variables
  - e is an additive error term of classroom-specific unobservable influences
  - u is an additive error term of centre-specific unobservable influences

Inputs

- Policy-relevant = staff-child ratio (by age), group size (by age), ECE training
- Teacher = professional development, job experience, unobserved ability/effort
- Centre = Director's education, job experience, professional development, percent teachers with 2 year ECE, new centre, revenue per child
- Child = ages in classroom, percent receiving subsidy

Data

- Detailed on-site observations of process quality in child care classrooms - You Bet I Care! (YBIC!)
- Data from observed staff member, centre director
- 325 classrooms in 210 centres in six provinces and Yukon Territory
- Urban locations; centres chosen randomly within commercial and non-profit strata.
- Missing values – multiple imputation
- ITERS-ECERS: Cronbach's alpha .905 – 7 sub-scales

A properly specified regression

- Should include all potential determinants of quality on the right-hand side
- Should omit factors determined by quality or otherwise correlated with error term
- Should include proxies for known determinants of quality that are difficult to measure (unobservable)

Pattern of results

- Significant results:
  - Child-staff ratio
  - group size and square
  - ECE training (college)
  - director's education
  - director's experience
  - Percent of subsidized children
  - percent ECE-trained staff
  - new centre (2 years or less)
- Insignificant:
  - group size (infant), professional development, teacher experience, director's professional development

Wages and financial resources

- Gross wage or highest wage full-time are significant if added
- Add control for monthly revenue per child (fee plus grants plus donations); wages are no longer significant

Proxy for unobservable teacher ability/effort

- Use CIS as individual-based measure
- Instrument using wage residuals, wage increase, selection for practicum, province dummies
- Adding effort moves adjusted R-squared to .36 from .28, little change in other variables
- Unobservable teacher characteristics mostly uncorrelated with other inputs

How big are the effects?

- ITERS/ECERS are measured on scale of 1 to 7; mean of 4.61; standard deviation of 1.12
- Decrease in child/staff ratio by 1 child (toddler, infant) will increase quality by about .25
- Decrease in group size by 1 child will decrease quality by .02 (preschool) or .06 (toddler). Max quality at 12.5 (preschool), 9.65 (toddler)
- Increase in caregiver training from less than one year ECE to college diploma increases quality by .52. Further ECE does not add.

How big are the effects? (2)

- College diploma for director: .33
- Percent staff with 2 year ECE: .04 for each additional 10%
- New centre: -.54
- Revenue per child: $100 per month = .09
- Unobserved teacher ability/effort: 1 point on 4 point scale = .7

What does a centre fixed-effects model do?

- Inserts a dummy variable for every centre in data set (eliminates all other centre-specific variables from estimation)
- Estimates are therefore based only on the quality variations between rooms within the same centre (between-centre quality differences are captured by centre dummies)

Why a fixed-effects model?

- There may be unobserved centre-specific contributors to quality that are correlated with structural factors (e.g., enthusiasm and leadership of director)
- Omitting between-centre quality variations still leaves within-centre quality variations and these should be affected by differences in structural features between classrooms in same centre

Is fixed-effects persuasive?

- Centre fixed-effect is leadership of director, resources of centre, character of families using centre
- Correlated with higher staff-child ratio, lower group size, higher staff education
- Requires systematic misperception of what produces quality

What's wrong with using within-centre variation?

- Rooms serve different ages
- Directors are unlikely to permit substantial quality variations between classrooms – largely measurement error
- Directors are likely to use unobserved resources to compensate for differences in staff-child ratio, group size and education that would otherwise create quality differences
- Finding of "no effect" in a fixed-effects model means directors are doing their jobs, not that structural features have no impact on quality

Conclusions

- Many factors contribute to quality
  - Regulatable inputs matter: child-staff ratio, group size, ECE training to college
  - Other variables matter: director's education, percent 2 year ECE, new centre, financial resources available
  - Unobservable teacher ability/effort is very important determinant of quality
  - Wages are correlated with quality, and may affect effort, but are not direct determinant of quality. Correlated with availability of financial resources
- centre fixed-effects model not useful

Grandir en Qualité

- Preliminary results for preschool classrooms – What matters in Quebec child care centres?
  - Teacher education
  - Teacher experience for those with < 10 yrs
  - Teacher professional development
  - Supervisor's education in CPE (strong positive) and garderie (strong negative)
  - Child-staff ratio when youngest <=3 yrs