Sustainability of Early Childhood Education Services: Evidence from Rural Indonesia

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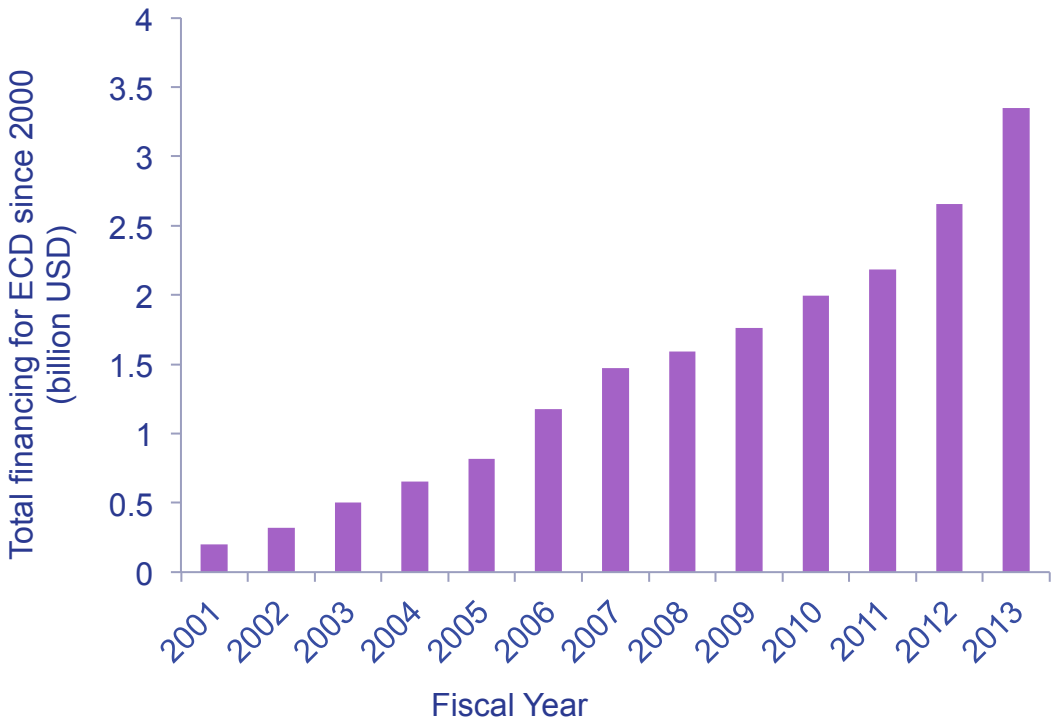
Motivation

Figure 1. World Bank (IBRD/IDA) financing for ECD since 2000



- Investments in early childhood education have increased globally.
- Yet we know very little about **whether** & **how** these investments are sustained.

Source: Sayre, Devercelli, Neuman & Wodon 2015

Sustainability

Definition:

Continued use of project components beyond their initial funding period (Scheirer & Dearing 2011).

This Paper

Research Question & Data

- What factors predict sustainability of early childhood education centers established under a large-scale development project in rural Indonesia?
- We use a panel data of early childhood education centers that received donor funding from 2009-2013.
- We revisited the centers in 2016 when donor funding had ended.

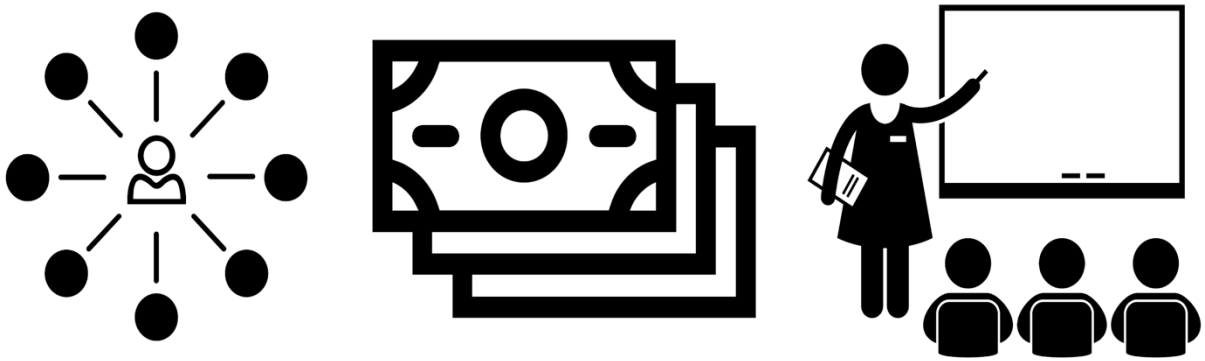
This Paper

Preview of Results

- Centers that were sustained had strategically reallocated resources towards teacher salaries and away from supplementary food.
- Observed classroom quality was significantly associated with sustainability.
- Support for early childhood education in local community predicts sustainability.

Study Context: Indonesia ECED Project

- World Bank & Government of Indonesia invested USD 67.5 million between 2009–2013 towards improving access to early childhood in rural areas.
- Communities received a package of intervention.



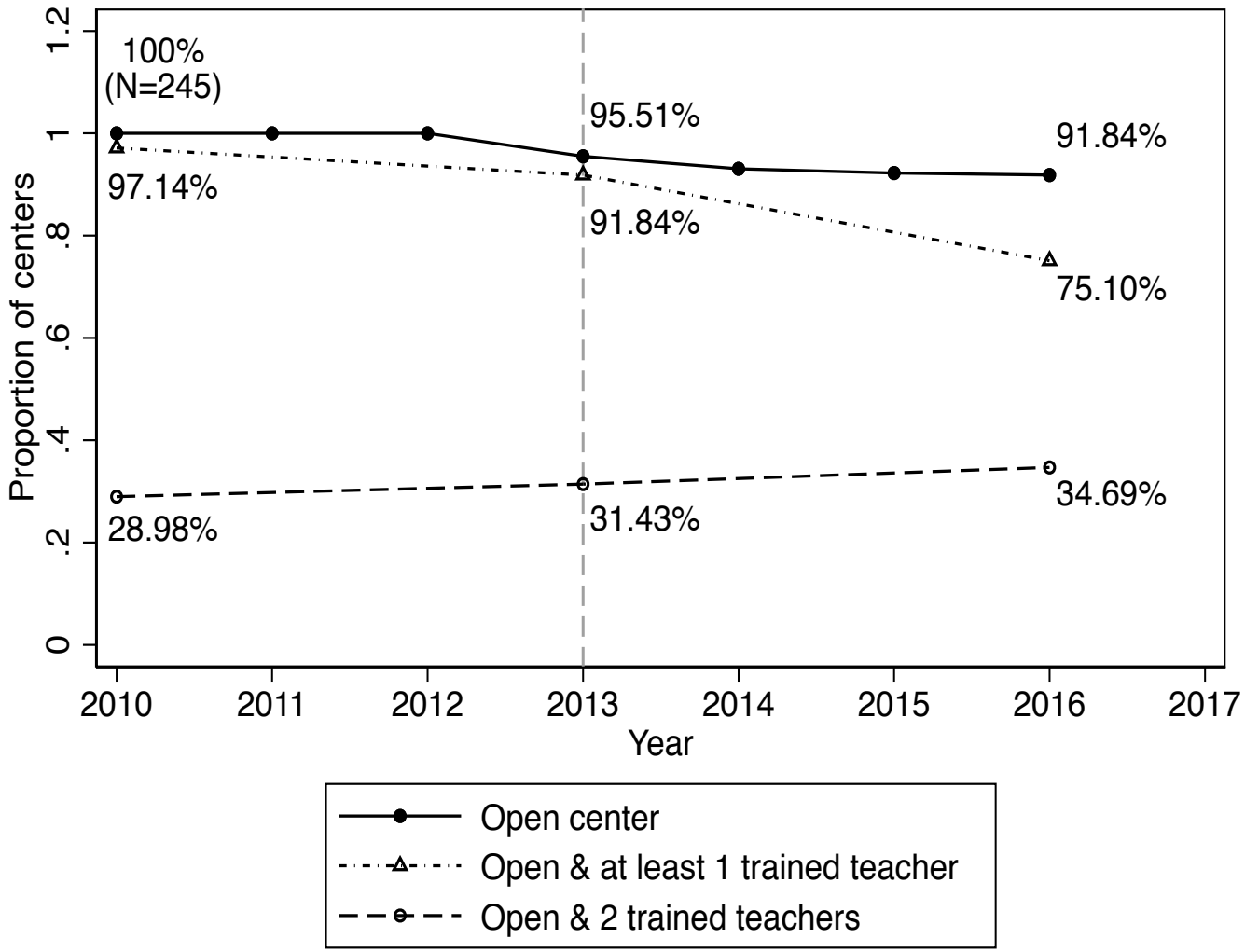
- Villages chose to establish **playgroups.**

Panel data on playgroups

- **Detailed survey**: Interviewed center administrator and teachers to collect information about operations, teacher characteristics, and funding modalities.
- **Closed center survey**: If centers were closed, we interviewed former center administrator and teachers to collect information about date of closure, key reasons for closure, and what happened to materials and teachers after the center closed.

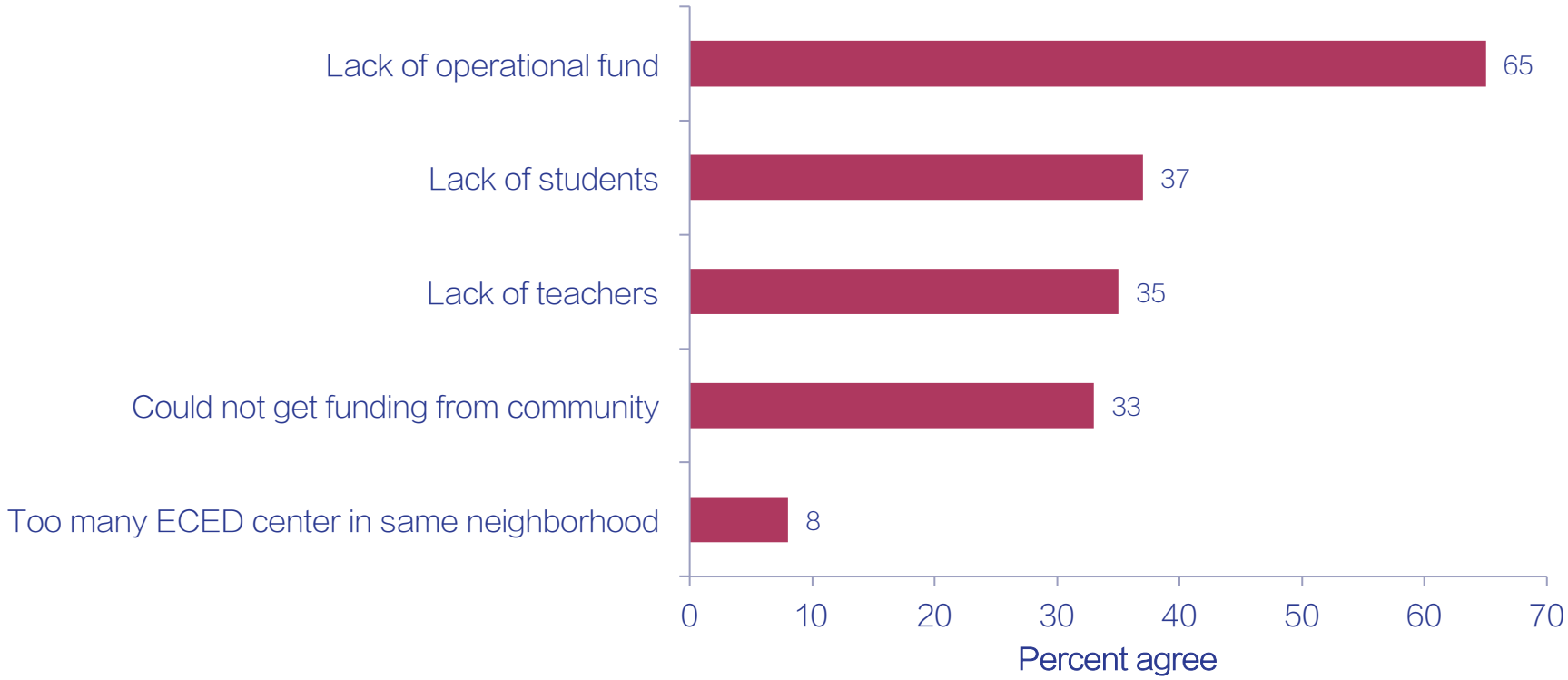
	Year							
Survey type	2009	2010	2011	2012	2013	2014	2015	2016
Detailed center information		N=432			N=245			N=245
Confirmed open/close status & Closed center survey								N=432

Figure 2. Proportion of established centers that are open and open with trained teachers between 2010–2016



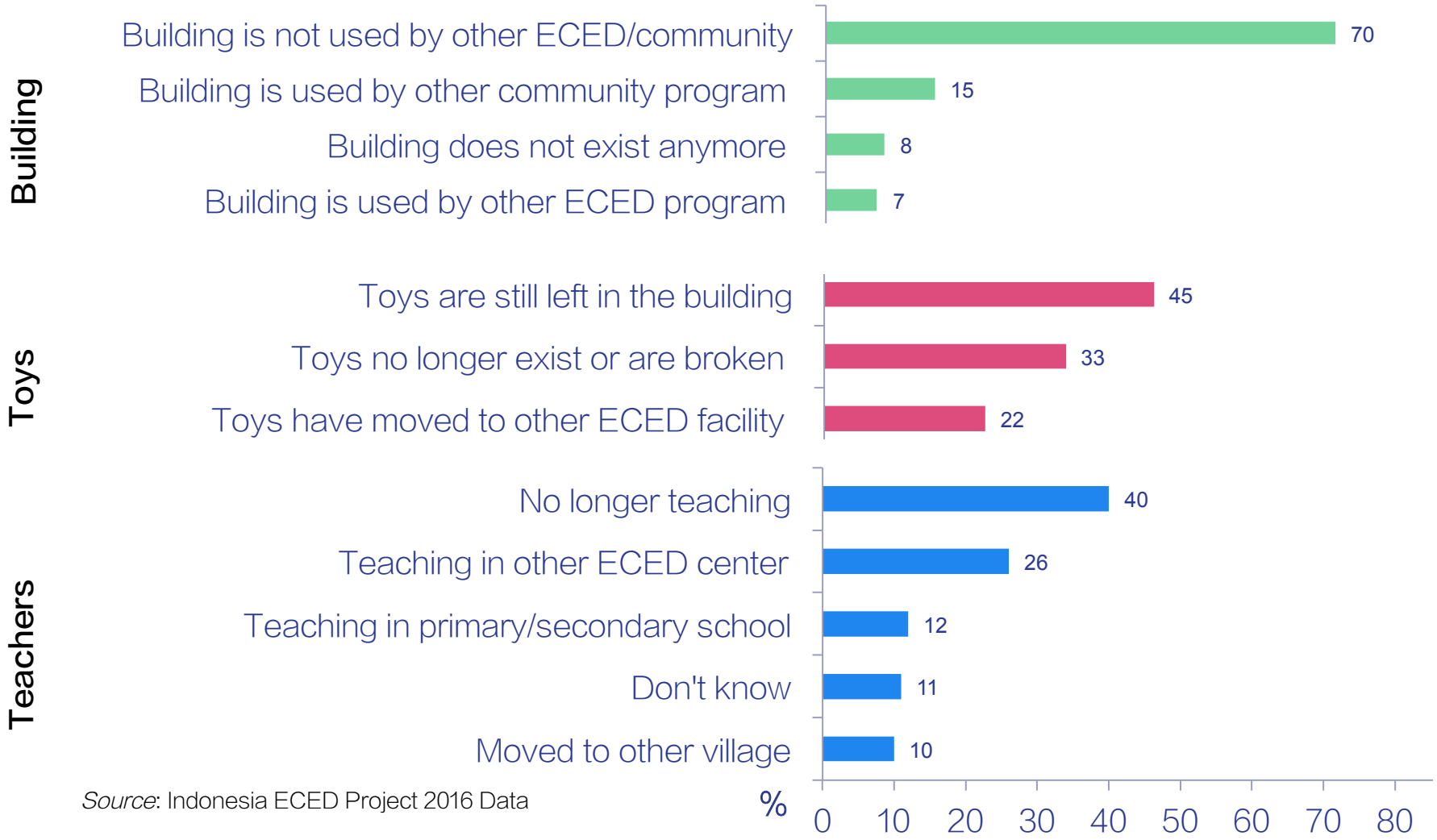
Source: Indonesia ECED Project 2010–2016 Data

Figure 3. Key reasons for center closure
(could select more than one)



Source: Indonesia ECED Project 2016 Data
Note: Reasons for center closure are not mutually exclusive categories (multiple answers possible).

Figure 4. What happened to the building, toys, and teachers in closed centers



Source: Indonesia ECED Project 2016 Data

Qualitative data from interviews

- Most administrators and teachers described a **chain of events** that led to the center closing:

  "When the project ended, we no longer had funds to pay the teachers and replace the books and toys that were damaged. So the teachers quit. And the students left. Nobody stepped up to keep the center."

- Many of the closed centers **tried to sustain** the centers before ultimately closing:

  "After the project ended, the center continued to operate for a year. During this time, the center relied on funding from the village government. The center held a meeting with local parents, requesting them to pay tuition fees in order to maintain the center. But this was not successful."

- In some centers, **disagreement between different stakeholders** contributed to center closure:

  " *There was a conflict between the board members of the village education department and the village chief. The chief did not trust the board members and decided that the center would only receive support from the village government for one year, but not indefinitely*."

Predicting center sustainability

- We identified five categories of predictors of sustainability based on the literature and study context: finance, quality, market condition, supplementary services, community involvement.
- Estimate logistic regression model for each category of predictors:

$$\log\left(\frac{p_{i,t}}{1-p_{i,t}}\right) = \alpha + \beta_k X_{k,i,t-}$$

where $p_{i,t}$ is the probability that the center was sustained in 2016, measured by
(i) whether a center was open;
(ii) whether a center was open with two trained teachers;
and $X_{k,i,t-}$ are *k* predictors measured in 2010/2013.

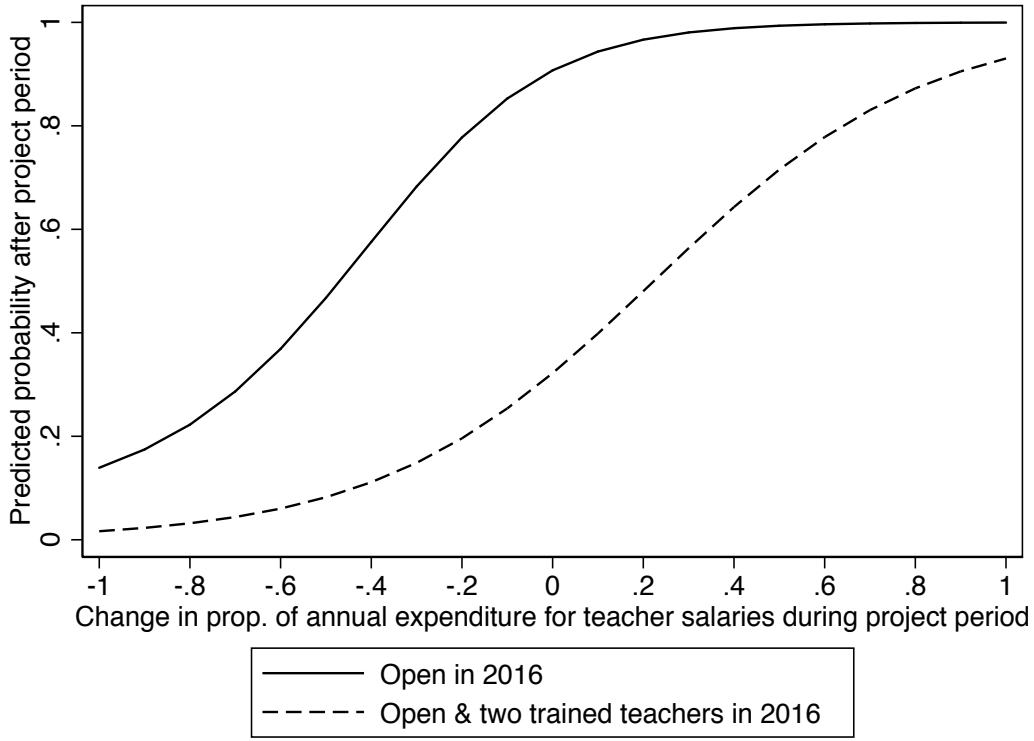
1. Finance

Why examine finance?

- Prior studies suggest that a key challenge for sustainability is securing post-project funding.
  - Example: Withdrawal of donor support for a literacy project in Zambia (Meki Kombe & Herman 2017).
- Sustainability has been correlated with funding source and how money is spent.
  - Example: Lower closure rates among child care centers in Canada that received funding from the government and paid higher wages to staff (Kershaw et al. 2005)
- Measures: Amount of funding received from government, non-government sources, parents; % of expenditure on teacher salaries.

1. Finance: Results

Figure 5. Probability of sustainability and change in expenditure on teacher salaries



- Source of funding was not a significant predictor (controlling for expenditure).
- Centers that increased proportion of expenditure on teacher salaries were significantly more likely to be sustained (controlling for source of funding).

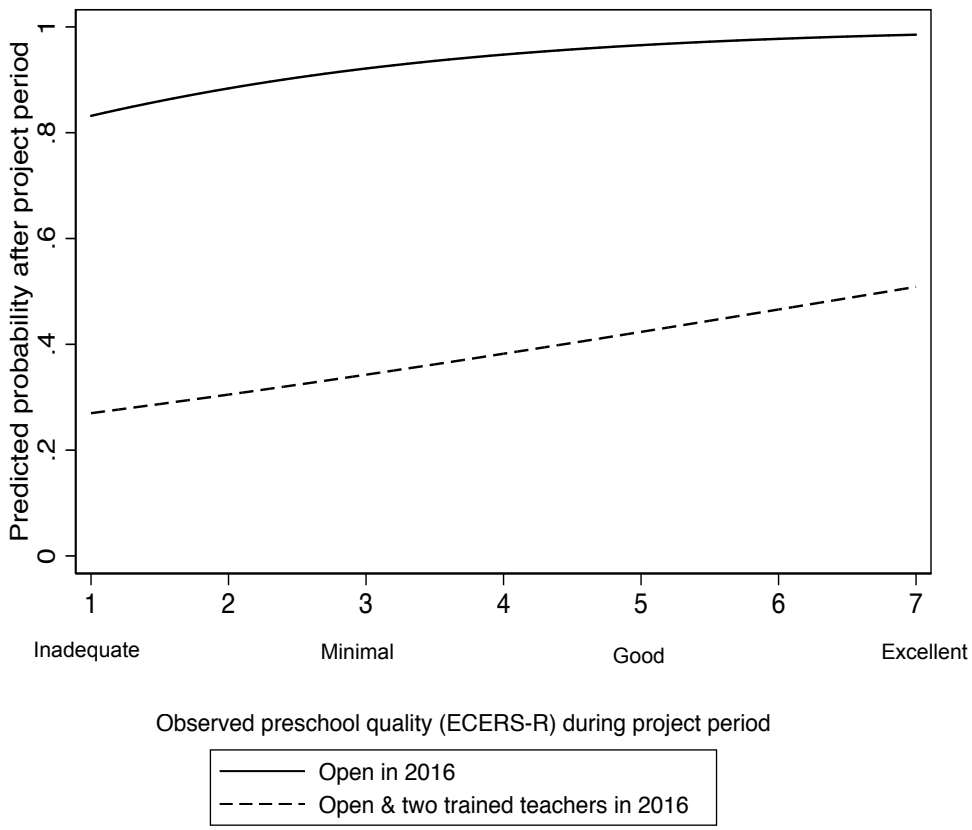
2. Quality

Why examine quality?

- Prior studies suggest that quality of service predicts sustainability.
  - Example: Child care centers were more likely to remain open when teachers had higher qualifications as measured by education and teaching experience (Kershaw et al. 2005; Lam et al. 2013).
- Measures: Educational attainment of teachers; years of experience of teachers; observed classroom quality.

2. Quality: Results

Figure 6. Probability of sustainability and observed preschool quality



- Over and above teacher qualification and experience, observed classroom quality was a significant predictor of a center remaining open in 2016 (note: not for open & two trained teachers).

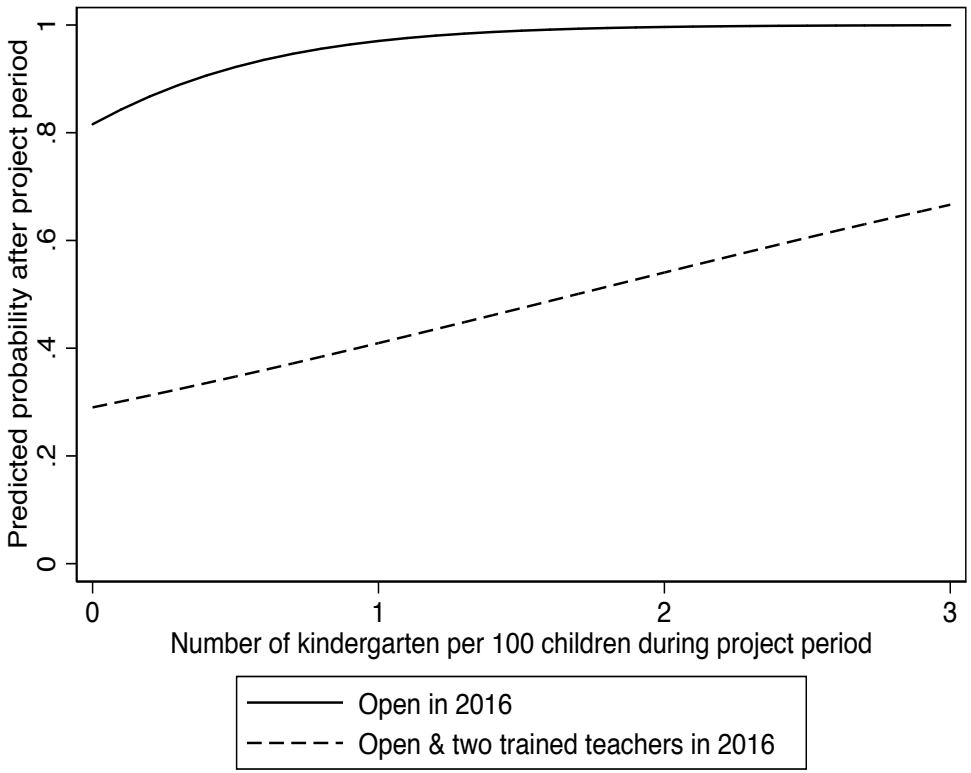
3. Market conditions

Why examine market conditions?

- Playgroups were established under the project in villages where other playgroups and kindergartens were operating. How might the local market for early childhood education predict sustainability?
  - Kindergarten: complements playgroup established under project.
  - Other playgroups: substitutes playgroup established under project.
- Measures: Number of kindergarten per 100 children in village; Number of other playgroups per 100 children in village.

3. Market condition: Results

Figure 7. Probability of sustainability and number of kindergarten in village



- The number of kindergartens was a significant predictor for sustainability (controlling for the number of other playgroups).
- The number of other playgroups was not a significant predictor of sustainability (controlling for the number of kindergartens).

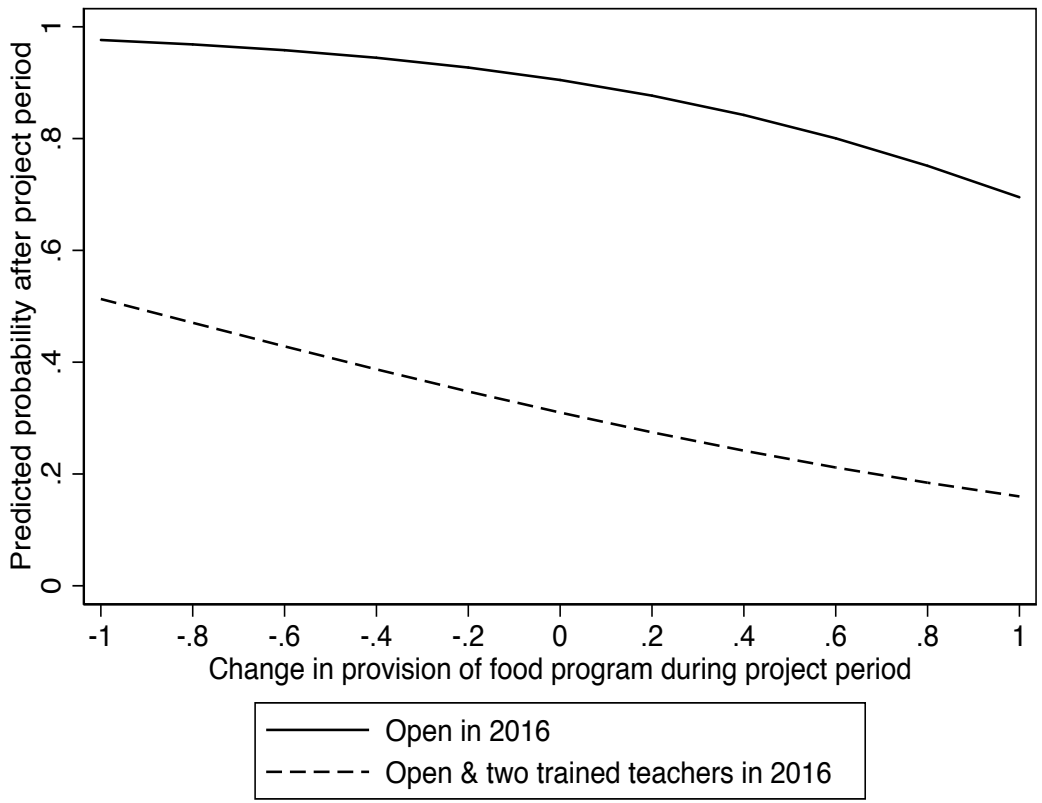
4. Supplementary services

Why examine supplementary services?

- Evidence from the health sector that supplementary services predict sustainability.
  - Example: Rural hospitals offering a range of medical services relative to other neighboring hospital have significantly lower risk of closure because they can differentiate themselves from other hospitals (Succi et al. 1997).
- Measures: Whether a center provided weekly vitamin, weekly supplementary food; whether a center ever provided deworming medication.

4. Supplementary services: Results

Figure 8. Probability of sustainability and change in provision of food program



- Centers that increased food provision during the project period was significantly less likely to be sustained (controlling for the provision of vitamin and deworming medication).
- Suggestive evidence that sustained centers took strategic measures of reducing food provision and increasing teacher salaries.

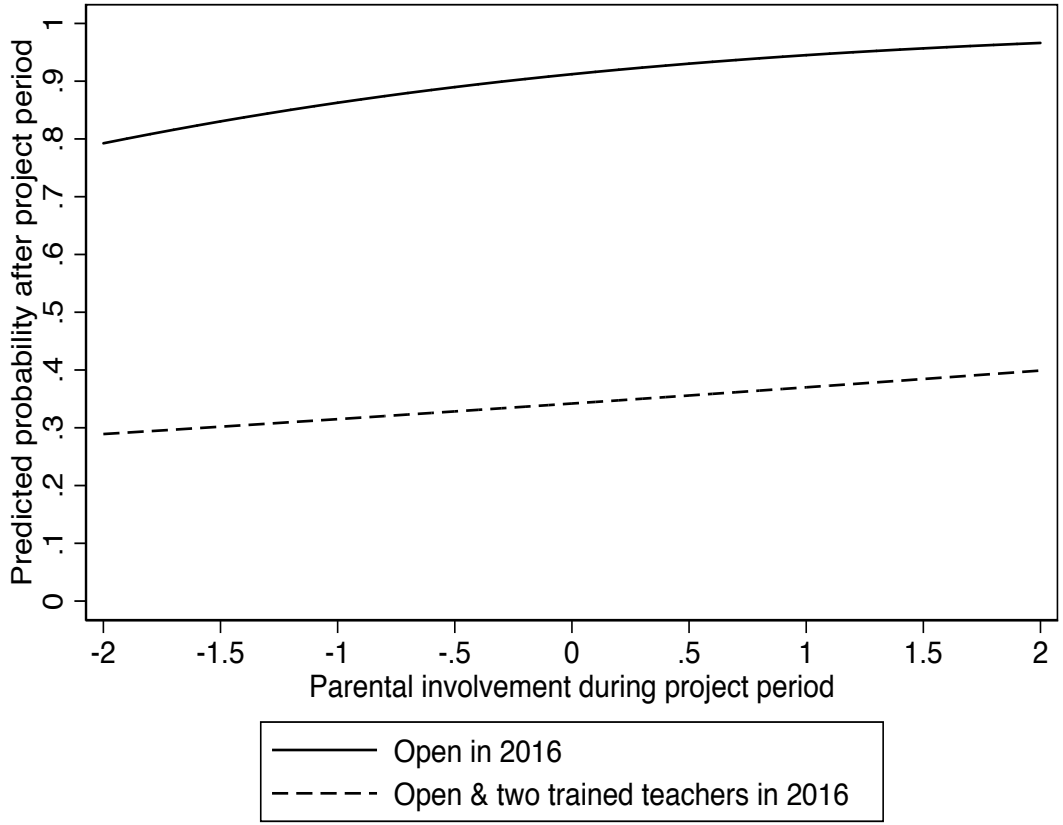
5. Community support

Why examine community support?

- Research from education policy points to the importance of community support in sustaining reform efforts.
  - Example: Support from local stakeholders is a strong positive predictor of successful institutionalization of school reforms (Bryk et al. 2010).
- Measure: Parental involvement in school

5. Community support: Results

Figure 9. Probability of sustainability & parental involvement



- Parental involvement in schools was a significant predictor of a center remaining open in 2016 (note: not for open & two trained teachers).

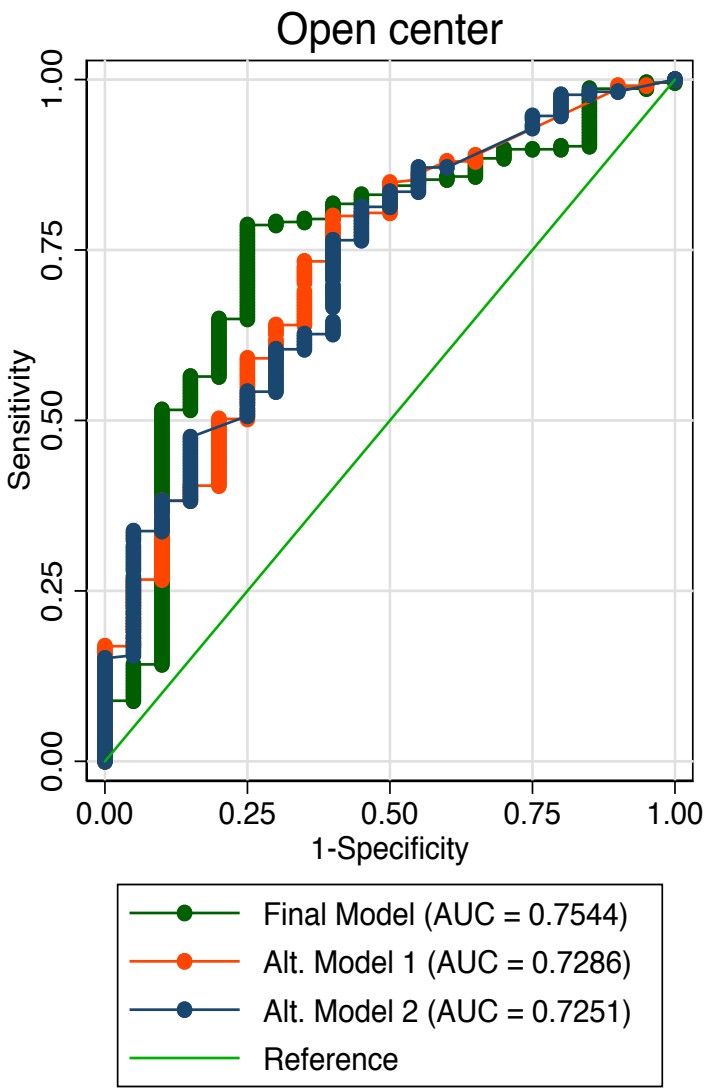
Predicting sustainability

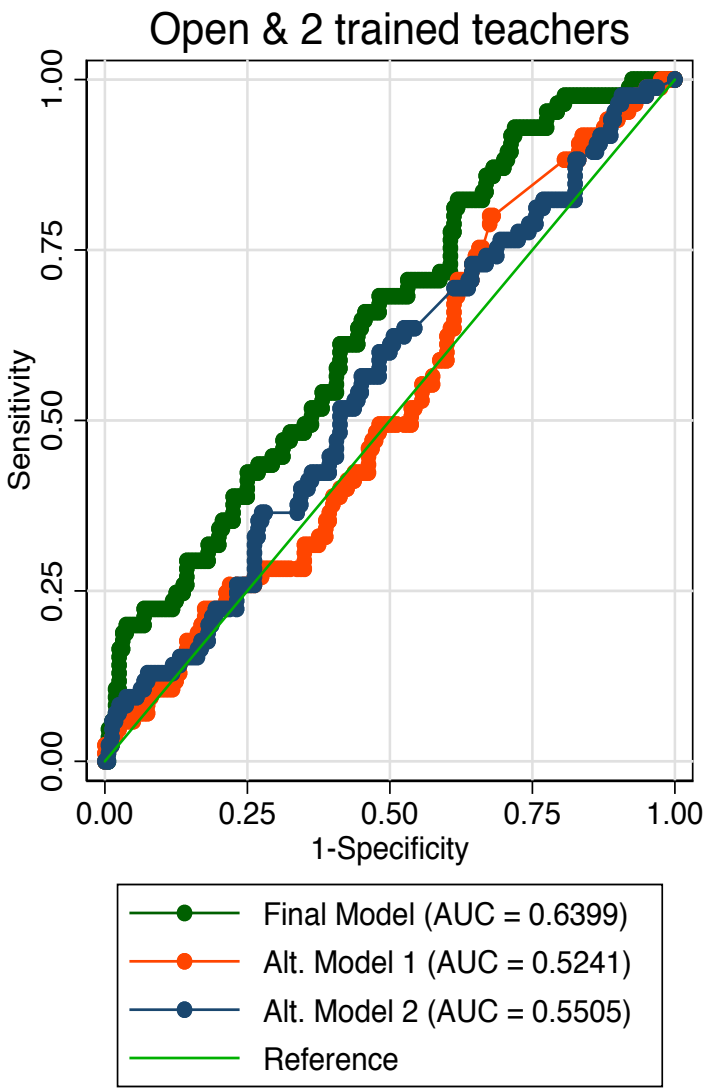
- Final model with five key predictors:
  1. Finance: Change in proportion of expenditure on teacher salaries;
  2. Quality: Observed classroom quality;
  3. Market condition: Number of kindergartens;
  4. Supplementary services: Change in provision of food program;
  5. Community support: Parental involvement.

- Use *k*-fold cross-validation to assess how well this final model predicts sustainability.

- Compare the predictive power of this final model against two alternative models that use the non-significant predictors from each category.

Model assessment





Conclusions

- Vast majority (92%) of playgroups were sustained.
  - Survey and qualitative data suggest that closed centers struggled to find financial and human resources necessary to continue operation.

- Evidence that sustained centers **reallocated resources** toward teachers and away from supplementary food programs.
- **Center quality** (beyond teacher qualification and experience) was significantly associated with sustainability.
- **Support for early childhood education** in local community (both in terms of number of kindergarten and parental involvement) predicts sustainability.

- **Caveats**: Relatively small sample size (N=245) and not causal study – aim is to understand predictors of sustainability.

Implications for policy & practice

- Strategies for sustainability of project activities should be introduced before the end of the project, ideally during the early stages of project implementation.
- Directly consult with important stakeholders, which more often than not are the parents in early childhood education projects.
- Future ECD projects will benefit from conducting a careful assessment of the types of early childhood programs existing in the local community in order to better understand the market conditions before project implementation.

Thank you!

Welcome any feedback/comments:

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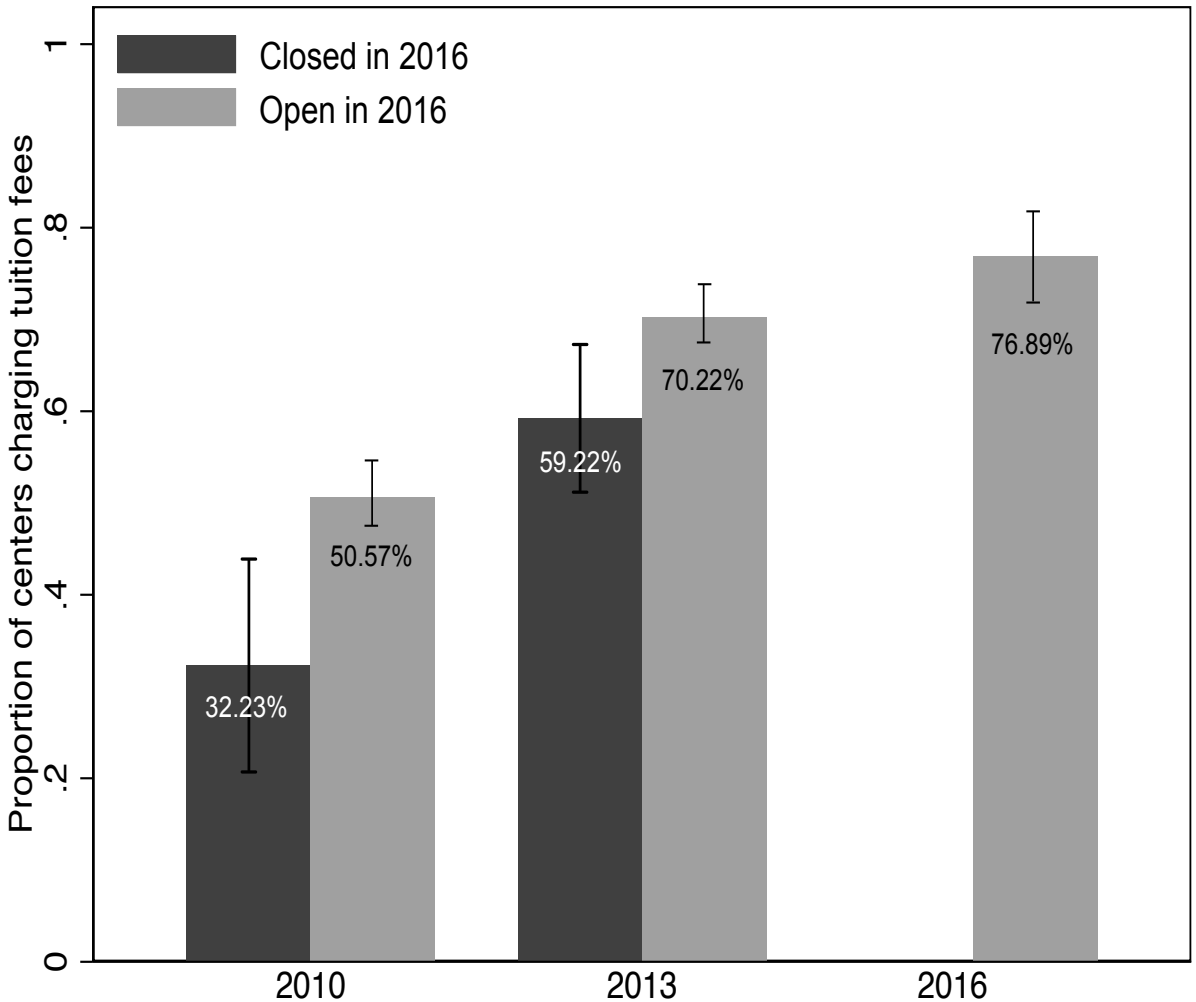
Appendix

Appendix Figure 1. Centers charging fees to students by year and center status in 2016



Note: Plot of proportion of centers charging fees to students in each year. Black bars indicate centers that were closed in the 2016 survey (hence no observations in 2016). Grey bars indicate centers that were open in the 2016 survey. 95% confidence interval bars shown.

Finance

Table 2. Summary statistics of center finance

Year of survey:	2010	2013	Diff
Finance (units: million IDR)			
Amount from government in 2009-2013	.	22.25	.
	.	[49.53]	.
Amount from non-government in 2009-2013	.	0.6	.
	.	[3.44]	.
Amount from parents in 2009-2013	.	4.7	.
	.	[19.41]	.
Proportion of annual expenditure for teacher salaries	0.15	0.18	0.03***
	[0.07]	[0.08]	(0.01)

* p<0.10, ** p<0.05, *** p<0.01
Note: Cells with . indicate that the variable was not collected that year. Brackets indicate standard deviation; parentheses indicate robust standard errors clustered by village.

Quality

Table 3. Summary statistics of center quality

Year of survey:	2010	2013	Diff
Quality			
Score from classroom observation (ranges from 1-7)	.	3.09	.
	.	[0.98]	.
Proportion of teachers with post-secondary degree	0.20	0.23	0.03
	[0.34]	[0.31]	(0.02)
Proportion of teachers with teaching experience	0.31	0.36	0.06*
	[0.42]	[0.45]	(0.03)

* p<0.10, ** p<0.05, *** p<0.01
Note: Cells with . indicate that the variable was not collected that year. Brackets indicate standard deviation; parentheses indicate robust standard errors clustered by village.

Market condition

Table 4. Summary statistics of market condition

Year of survey:	2010	2013	Diff
Market condition (unit: per 100 children in village)			
Number of kindergartens	0.71	0.50	−0.21**
	[1.45]	[0.56]	(0.10)
Number of other playgroups	0.35	0.28	−0.08
	[1.45]	[0.54]	(0.10)

* p<0.10, ** p<0.05, *** p<0.01
Note: Cells with . indicate that the variable was not collected that year. Brackets indicate standard deviation; parentheses indicate robust standard errors clustered by village.

Supplementary services

Table 5. Summary statistics of supplementary services

Year of survey:	2010	2013	Diff
Supplementary services			
Provides weekly food program (1=Yes)	0.44	0.26	−0.18***
	[0.48]	[0.44]	(0.03)
Provides weekly vitamin (1=Yes)	0.08	0.07	−0.01
	[0.25]	[0.26]	(0.02)
Provides anti−worming medication (1=Yes)	0.46	0.63	0.17***
	[0.49]	[0.48]	(0.04)

* p<0.10, ** p<0.05, *** p<0.01
Note: Cells with . indicate that the variable was not collected that year. Brackets indicate standard deviation; parentheses indicate robust standard errors clustered by village.

Community support

Table 6. Summary statistics of community support

Year of survey:	2010	2013	Diff
Community support			
Parental involvement index (z-score)	0.00	0.13	0.13
	[1.02]	[1.07]	(0.08)

* p<0.10, ** p<0.05, *** p<0.01
Note: Cells with . indicate that the variable was not collected that year. Brackets indicate standard deviation; parentheses indicate robust standard errors clustered by village. Parental involvement is constructed from a principal component analysis of four items: parents are involved in activities with teachers and students in the center; parents are involved in cleaning the center; parents are involved in supplementary food program in the center; parents are involved in acquiring toys and materials in the center. The index is normalized to have mean 0 and standard deviation 1 in 2010. A higher value of the index means more parental involvement.

Appendix Table 1. Summary statistics of project playgroups

	All project playgroups (N=432)		Panel project playgroups (N=245)		Diff between panel and non-panel	
Center characteristics in 2010	Mean	(S.D.)	Mean	(S.D.)	Diff	(S.E.)
Finance						
Center did not charge student fees (1=Yes)	0.52	(0.49)	0.52	(0.49)	0.00	(0.05)
Average wealth of households (z-score)	-0.02	(0.97)	-0.07	(0.99)	0.10	(0.09)
Percent of block grant spent on:						
Administrative support	14.50	(12.94)	14.35	(12.72)	0.36	(1.26)
Children	36.25	(11.10)	36.25	(12.13)	-0.00	(1.05)
Infrastructure	30.86	(14.15)	31.10	(15.46)	-0.56	(1.33)
Teachers	15.37	(7.21)	15.15	(7.33)	0.51	(0.70)
Outreach	3.02	(4.51)	3.16	(5.38)	-0.31	(0.41)
Quality						
Teachers with post-secondary degree (1=Yes)	0.20	(0.35)	0.20	(0.34)	0.01	(0.03)
Teachers with ECED teaching exp. (1=Yes)	0.32	(0.42)	0.31	(0.42)	0.02	(0.04)
Market condition						
No. of kindergarten per capita	0.67	(1.20)	0.71	(1.45)	-0.09	(0.11)
No. of non-project playgroup per capita	0.28	(1.19)	0.35	(1.45)	-0.16	(0.11)
Supplementary services						
Provides weekly supplementary food program (1=Yes)	0.45	(0.49)	0.44	(0.48)	0.02	(0.05)
Provides weekly vitamin provision (1=Yes)	0.10	(0.27)	0.08	(0.25)	0.03	(0.03)
Ever provided anti-worm medicine (1=Yes)	0.47	(0.49)	0.46	(0.49)	0.03	(0.05)
Community support						
Parental involvement in center (z-score)	0.00	(1.00)	0.00	(1.02)	-0.00	(0.10)

*** p<0.01, ** p<0.05, * p<0.1

Note: Data from the 2010 Indonesia ECED Survey. See main text for definition of variables. Robust standard errors clustered at the center level. Column of difference is a regression of the variables on an indicator for whether playgroup was a panel center (measured in 2010, 2013 and 2016) or not (only measured in 2010 and open/closed status checked in 2016).

Table 3. Logistic regression of center sustainability on finance characteristics

	(1) Center is open in 2016 (1=Yes)	(2) Center is open & two trained teachers (1 = Yes)
Finance (units: 100 million IDR)		
Amount from government in 2009-2013	0.28	0.03
	(0.28)	(0.06)
Amount from non-government in 2009-2013	0.70	0.08
	(0.48)	(0.92)
Amount from parents in 2009-2013	0.33	0.04
	(0.35)	(0.14)
Proportion of annual expenditure on teacher	0.48*	-0.18
salaries in 2010	(0.28)	(0.52)
Change in proportion of annual expenditure	0.40*	0.73*
on teacher salaries from 2010-2013	(0.21)	(0.38)
Log-likelihood	-62.63	-154.29
Observations	245	245

* p<0.10, ** p<0.05, *** p<0.01

Note: Robust standard errors clustered by center. Coefficients are marginal effects.

Table 4. Logistic regression of center sustainability on quality characteristics

	(1) Center is open in 2016 (1=Yes)	(2) Center is open & two trained teachers (1 = Yes)
Quality		
Observed quality in 2013	0.03*	0.04
	(0.02)	(0.03)
Proportion of teachers with post secondary degree in 2010	0.08	0.05
	(0.07)	(0.12)
Change in proportion of teachers with post secondary degree from 2010-2013	0.00	-0.06
	(0.07)	(0.09)
Proportion of teachers with teaching experience in 2010	0.04	-0.05
	(0.06)	(0.09)
Change in proportion of teachers with teaching experience from 2010-2013	0.00	0.06
	(0.04)	(0.08)
Log-likelihood	-65.97	-156.86
Observations	245	245

* p<0.10, ** p<0.05, *** p<0.01

Note: Robust standard errors clustered by center. Coefficients are marginal effects.

Table 5. Logistic regression of center sustainability on market conditions

	(1) Center is open in 2016 (1=Yes)	(2) Center is open & two trained teachers (1 = Yes)
Market conditions		
Number of kindergartens in 2010	0.16**	0.12*
	(0.07)	(0.06)
Change in number of kindergartens from 2010-2013	-0.11	-0.11
	(0.07)	(0.07)
Number of other playgroups in 2010	-0.11	-0.10
	(0.09)	(0.08)
Change in number of other playgroups from 2010-2013	0.12*	0.08
	(0.07)	(0.07)
Log-likelihood	-63.83	-155.81
Observations	245	245

* p<0.10, ** p<0.05, *** p<0.01

Note: Robust standard errors clustered by center. Coefficients are marginal effects. Number of playgroup and kindergarten are in units per 100 children in the village.

Table 6. Logistic regression of center sustainability on supplementary services

	(1) Center is open in 2016 (1=Yes)	(2) Center is open & two trained teachers (1 = Yes)
Provided food program in 2010 (1=Yes)	0.08	0.14*
	(0.05)	(0.08)
Change in provision of food program from 2010-2013	-0.11**	-0.19***
	(0.04)	(0.06)
Provided vitamin in 2010 (1=Yes)	-0.09	-0.04
	(0.07)	(0.17)
Change in provision of vitamin from 2010-2013	0.10	0.12
	(0.07)	(0.13)
Provided anti-worming medication in 2010 (1=Yes)	0.00	0.04
	(0.04)	(0.08)
Change in provision of anti-worming medication	0.02	0.05
from 2010-2013	(0.04)	(0.06)
Log-likelihood	-63.75	-152.46
Observations	245	245

* p<0.10, ** p<0.05, *** p<0.01

Note: Robust standard errors clustered by center. Coefficients are marginal effects.

Table 7. Logistic regression of center sustainability on community support

	(1) Center is open in 2016 (1=Yes)	(2) Center is open & two trained teachers (1 = Yes)
Community support		
Parental involvement (z-score) in 2010	0.04*	0.03
	(0.02)	(0.04)
Change in parental involvement from 2010-2013	-0.03	0.03
	(0.02)	(0.03)
Log-likelihood	-67.93	-155.87
Observations	245	245

* p<0.10, ** p<0.05, *** p<0.01

Note: Robust standard errors clustered by center. Coefficients are marginal effects.

Table 8. Logistic regression of center sustainability

	(1) Center is open in 2016 (1=Yes)	(2) Center is open & two trained teachers (1 = Yes)
Change in proportion of expenditure on teacher salaries from 2010-2013	0.07	0.73**
	(0.15)	(0.28)
Observed quality in 2013	0.03*	0.03
	(0.02)	(0.03)
Number of kindergarten in 2010	0.07	-0.00
	(0.05)	(0.05)
Change in provision of food program from 2010-2013	-0.07**	-0.14**
	(0.03)	(0.06)
Parental involvement (z-score) in 2010	0.01	0.05*
	(0.02)	(0.03)
Log-Likelihood	-62.630	-149.625
Observations	245	245

* p<0.10, ** p<0.05, *** p<0.01

Note: Robust standard errors clustered by center. Coefficients are marginal effects.