Estimating household and individual level impacts: the experience of Kenya

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Outline of the presentation

1. Background of Kenya CT-OVC
2. Data issues and estimation strategies
3. Impact of the CT-OVC
4. Final remarks

Background - Kenya CT-OVC

- Government's flagship social protection program
- Reached 129,526 households as of end of 2011 with the ultimate goal of providing coverage to 300,000 households or 900,000 OVC
- Targets households who are ultra-poor and contain an OVC
- Eligible households receive a flat monthly transfer of 21 USD (Ksh1500)
- Unconditional - no punitive sanctions for noncompliance
- Provide a social protection system through regular and predictable cash transfers to families living with OVCs to
  - Encourage fostering and retention of OVCs within their families and communities
  - Promote their human capital development

What are we doing with this study?

Provision of small but predictable flow of cash can facilitate change in economic activities

- Investment in productive assets
  - Ownership of livestock and agricultural implements
- Impact on agricultural production
  - Direct impact on agricultural production
    - Crop production, crop and livestock labor and input use, and credit use
  - Indirect impact on agricultural production
    - Share of own production in total consumption
- Impact on non agricultural production
  - Operation of non agricultural business
- Impact on labor supply
  - Participation and intensity of wage labor (overall, agricultural and non agricultural) and own farm labor

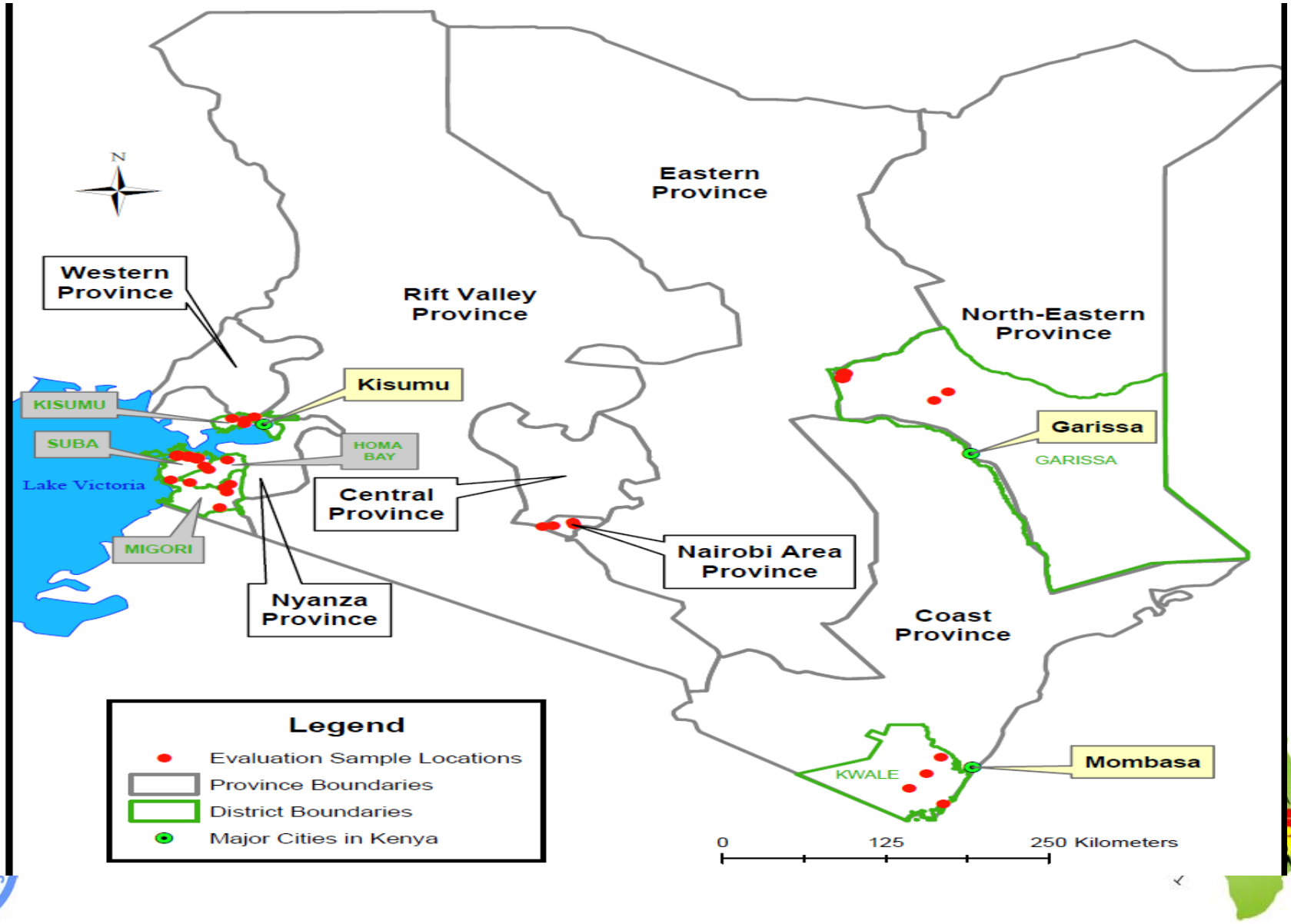
Overall, by gender of household head, and by household size

by gender, for adults and children.

Impact evaluation design

- 4 year, longitudinal, experimental design
  - Randomization at cluster level (28 units)
  - Baseline (2007) and first follow up (2009) carried out by OPM
  - Second follow up (2011) by UNC and FAO
- In 2011, added topics:
  - Sexual debut, partner characteristics, perceptions about peer behavior, marriage, pregnancy, mental health and risk
  - Economic activities
- 1811 households in second follow up (1783 used in our analysis)
  - 1280 treatment, 531 control
  - 18% attrition between R0 and R1; 5% between R1 and R2
    - Attrition was random

Map of the evaluation sites



Data limitations

- Baseline and follow up data available on
  - Share of own production in total consumption
  - Ownership of livestock and agricultural implements (partial, and based on recall)
- Only follow up data available on
  - Crop production, crop and livestock labor and input use, and credit use
  - Operation of non agricultural business
  - Participation and intensity of wage labor (overall, agricultural and non agricultural) and own farm labor
- No data on
  - Time devoted to housework

Agriculture is fundamental part of livelihoods of CT-OVC beneficiaries

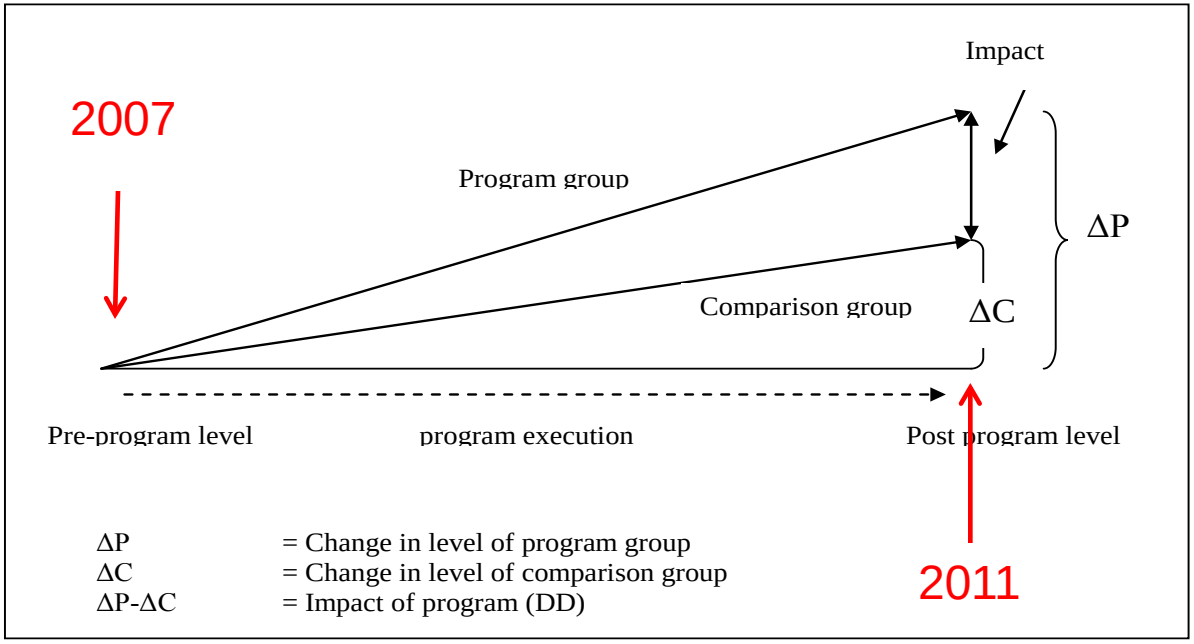
- Large majority are agricultural producers
  - Over 80% produce crops; over 75% have livestock
- Most grow local maize and beans, using traditional technology and low levels of modern inputs
- Most have low levels of assets
  - 2.6 acres of agricultural land, few small animals, basic agricultural tools and low levels of education
- Only 16 percent used credit in 2011
- 1/4 of adults worked in wage labor, 1/2 in own agriculture, 1/3 in own business, 1/5 private transfers
  - Women more in agricultural wage labour
  - Almost all wage labour is casual
- 42% of children worked on family farm

Framework for impact analysis

- Difference-in-Difference (DD) estimator for those outcomes for which we have baseline data

- Propensity score methods or Inverse probability weighting (IPW) for those outcomes for which we only have data in 2011

Difference-in-Difference (DD) estimator for those outcomes for which we have baseline data



Which type of DD estimator to use?

1. Just subtract differences
2. With controls in regression framework
3. With matching or with IPW

– Or do them all???

Household level results—DD estimator

Impact on productive assets & consumption

- Positive and significant impact on ownership of small livestock, for both smaller and female-headed households; ownership of troughs
- Increased consumption of higher value animal products
- Increased share of own production in consumption for cereals, animal products and other foods
  - Larger impact for smaller and female-headed households
- Differences between methods a question of significance

Impact on food consumption from own production (2007-11)

Difference-in-Difference with controls

	All	HH size <5	HH size 5 & above	Female head	Male head
Cereals	**0.086**	0.133	0.047	**0.114**	0.033
	(1.85)*	(1.59)	(1.02)	**(1.92)***	(0.52)
Legumes	-0.005	0.035	-0.023	0.034	- 0.082
	(-0.11)	(0.43)	(-0.54)	(0.58)	(-1.49)
Dairy and eggs	**0.097**	**0.130**	0.055	**0.101**	0.084
	(3.68)***	**(3.13)*****	(1.61)	**(3.00)*****	(1.52)
Meat and fish	**0.049**	**0.073**	0.023	**0. 054**	0.042
	(1.70)*	**(2.57)****	(0.54)	**(1.97)***	(0.73)
Vegetables	-0.007	0.028	-0.010	-0.045	0.059
	(-0.15)	(0.42)	(-0.20)	(-0.75)	(1.20)
Fruit	0.013	0.042	-0.004	0.035	-0.024
	(0.35)	(0.89)	(-0.10)	(0.81)	(-0.46)
Cooking oil	0.006	0.016	0.000	0.009	0.001
	(1.15)	(1.64)	(0.01)	(1.38)	(0.18)
Other foods	**0.043**	**0.051**	**0.042**	**0.043**	**0.048**
	(4.15)***	**(2.56)****	**(3.44)*****	**(3.72)*****	**(2.53)****
N	1783	698	1085	1137	646

Note: Statistical significance at the 99% (***), 95% (**) and 90% (*) confidence levels. The number in brackets shows standard errors.

Impact on food consumption from own production (2007-11)

Difference-in-Difference Matching

	All	HH size <5	HH size 5 & above	Female head	Male head
Cereals	**0.078**	0.081	**0.096**	**0.120**	0.003
	(0.044)*	(0.069)	**(0.059)***	**(0.042)*****	(0.061)
Legumes	-0.010	0.007	-0.01	0.028	- 0.073
	(0.030)	(0.036)	0(0.036)	(0.035)	(0.057)
Dairy and eggs	**0.134**	**0.174**	**0.096**	**0.130**	**0.145**
	(0.030)***	**(0.071)****	**(0.043)****	**(0.034)*****	**(0.065)****
Meat and fish	**0.049**	0.039	0.039	0.039	0.018
	(0.028)*	(0.036)	(0.035)	(0.028)	(0.050)
Vegetables	-0.023	-0.078	0.003	-0.047	-0.025
	(0.039)	(0.070)	(0.038)	(0.038)	(0.084)
Fruit	0.032	0.055	0.012	**0.071**	-0.047
	(0.027)	(0.059)	(0.036)	**(0.037)***	(0.059)
Cooking oil	0.002	0.008	-0.002	0.003	0.002
	(0.004)	(0.010)	(0.004)	(0.006)	(0.005)
Other food	**0.046**	**0.060**	**0.037**	**0.041**	**0.050**
	(0.010)***	**(0.027)****	**(0.010)*****	**(0.012)*****	**(0.020)****
N	1706	629	1077	1103	603

Note: Statistical significance at the 99% (***), 95% (**) and 90% (*) confidence levels. The number in brackets shows standard errors.

What about for those outcomes for which we only have data in 2011?

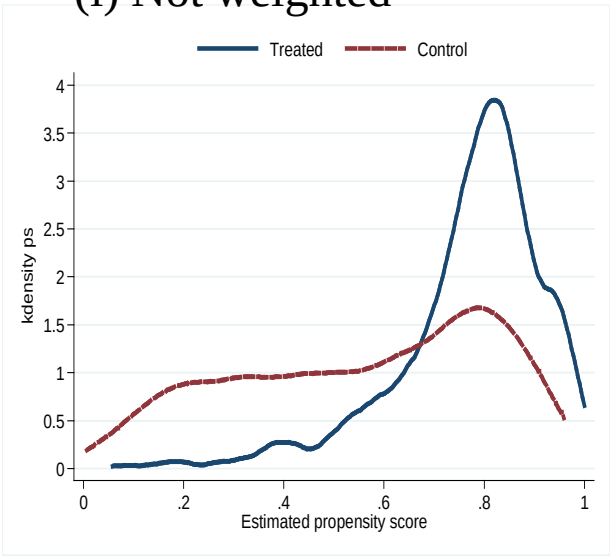
- How do we choose between:
  - PSM
    - Simple comparison or regression framework with controls
  - IPW
  - Do them all and see if robust across methods?
- For individual level outcomes, estimate the p-score at the household or individual level?
  - Is it more appropriate, for individual labor supply, to estimate households p-score or individuals p-score (age, education, health, marital status, and prior work experience)

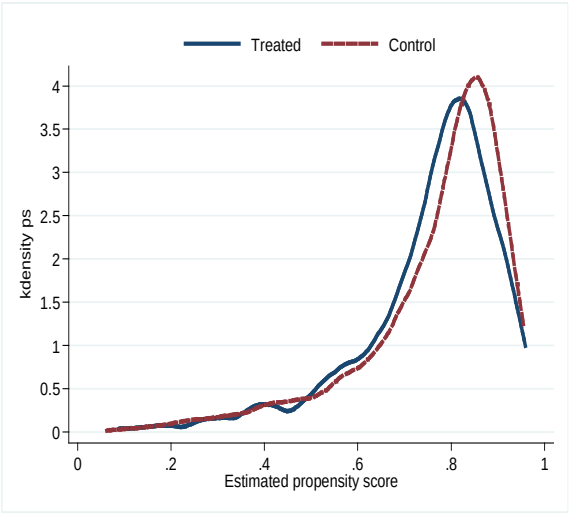
Kernel density of the propensity score for the treated and control groups

(i) Not weighted

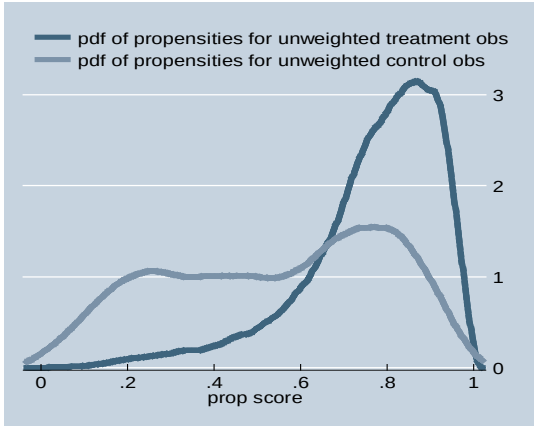
(ii) weighted

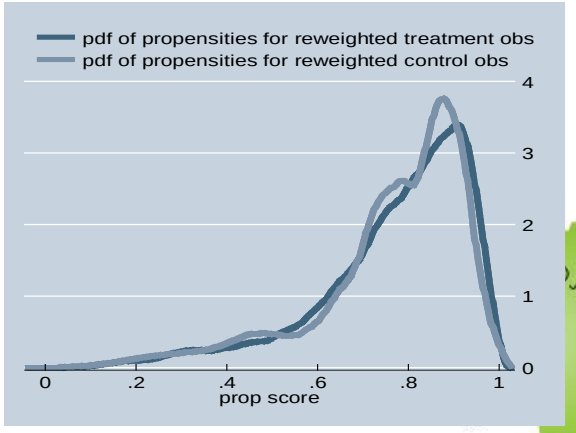
Household level p-score





Individual level p-score





Individual labour supply results—IPW estimator

Impact on overall wage labor participation

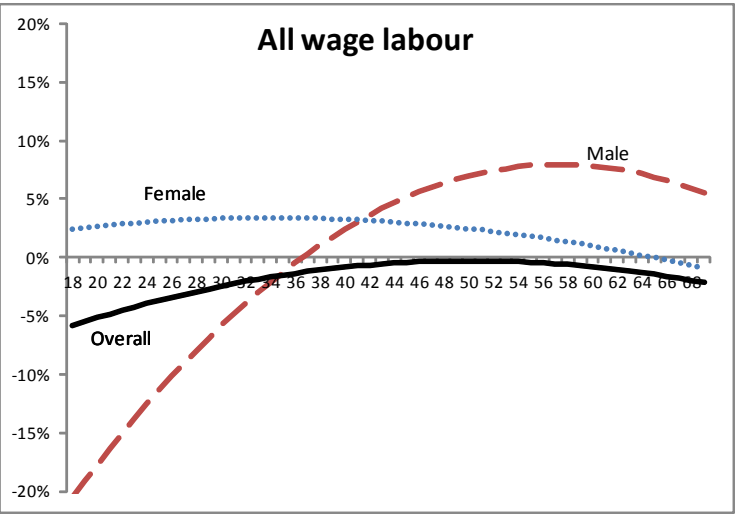
- Overall, for all individuals, no impact on participation in wage labor
- Large positive impact for those (particularly women) who live farther from markets

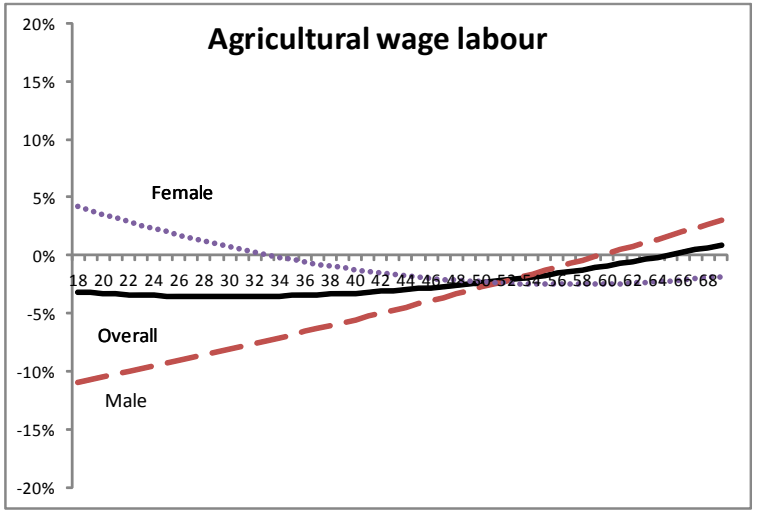
	Individual level weighting			
	Model 1	Model 2	Model 3	Model 4
Treatment	-0.026	-0.053*	-0.138	-0.025
Treatment * distance to market		**0.129****		
Treatment * age			0.005	
Treatment * age squared			-0.000	
Treatment * chronic illness				-0.004
District fixed effect	YES	YES	YES	YES
Number of observations	3,643	3, 643	3, 643	3, 643
Adjusted R2	0.098	0.101	0. 098	0. 098
F-test of joint significance		2.17*	16.20***	0.60

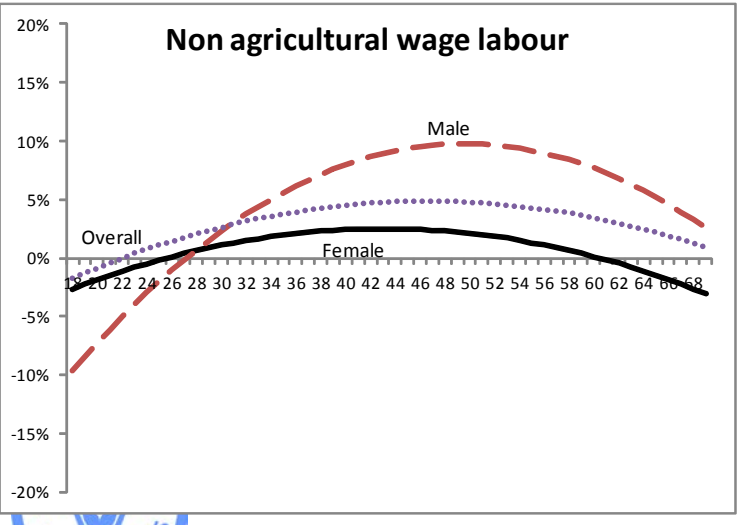
Note: *** p<0.01; ** p<0.05; * p<0.1. .

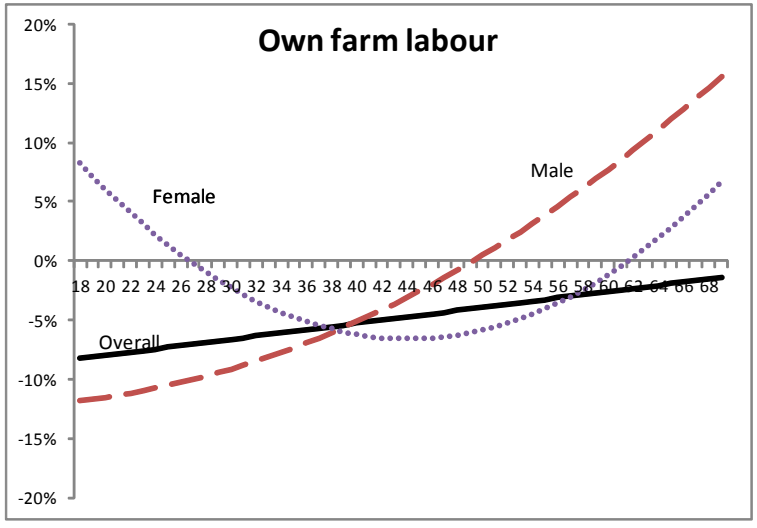
Control variables: individual level (gender, age, education, health), hh level (gender, age, education, household size, dependency ratio, education), community indictors, district fixed effect

Individual level results—IPW estimator
Participation in wage and non wage labor









Males: increasingly positive with age, both wage and own farm

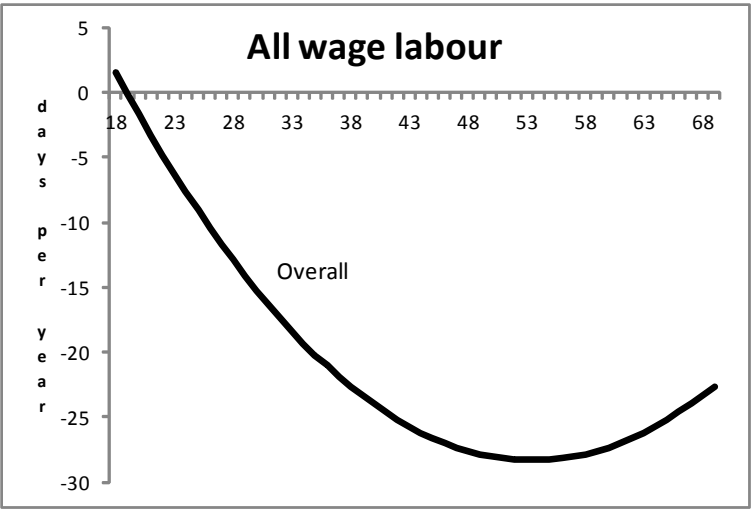
Females: More muted impact, reverses for ag wage labor

Some of positive impact on own farm increasing with age may be due to chronic illness

FIAT PANIS

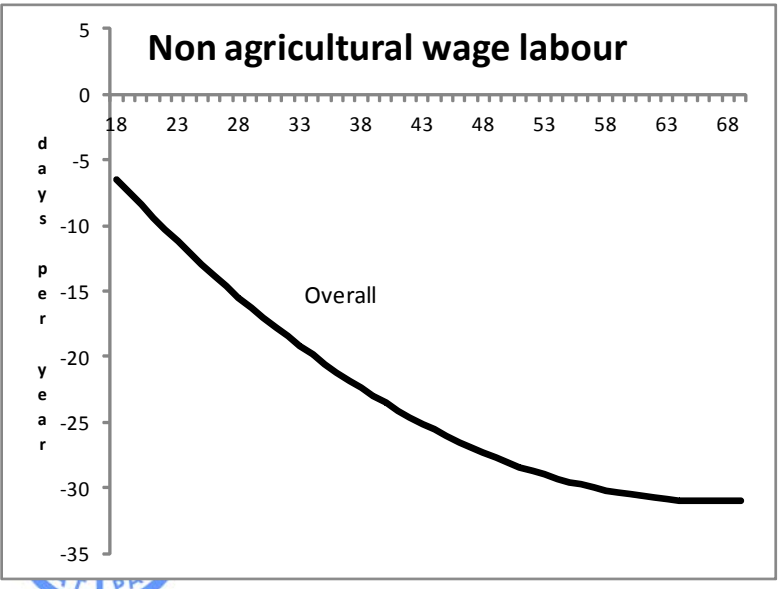
THE TRANSFER PROJECT

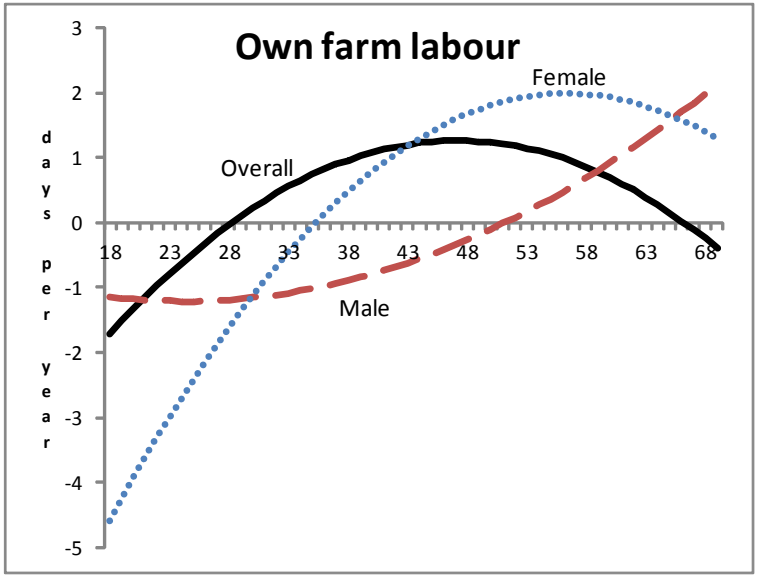
Individual level results—IPW estimator
Intensity of wage and non wage labor



Overall: Negative impact on wage labor intensity—but negative impact is concentrated among chronically ill

For both males and females, increasing intensity of own farm labor –substitution between wage and non wage labor?





Individual level results—IPW estimator

- Child labor supply
  - No impact on child participation in wage labor—but few work in the first place
  - Large and significant impact on reducing child labor on farm, for boys.
    - This impact is muted for boys in families living far from markets

Household level results—IPW estimator

- Agricultural production
  - Negative impact on seed and fodder expenditures—home production substituting for purchases?
  - Mixed impact for hiring in labor
- Non agricultural production
  - Positive impact on participation in nonfarm enterprise for female headed household, negative impact for male headed households
- No impact on credit use

Final remarks

- Our first paper—a lot of growing pains
- Despite data challenges, we find some interesting stories
  - Some impact on own farm production, but we can't tell whether substitution in inputs is occurring
  - Impact on non farm business formation
  - Impact on labor supply decisions
  - Impact varies by gender
- Choice of impact estimation methodology matters

Thank You!

Estimation methodology matters—household vs. individual matching

All individuals: participation in any wage labour activity

- Change in significance

	Household level weighting				Individual level weighting			
	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4
Treatment	-0.054**	-0.081***	-0.244**	-0.058**	-0.026	-0.053*	-0.138	-0.025
Treatment * distance to market		0.127**				0.129**		
Treatment * age			0.008				0.005	
Treatment * age squared			-0.000				-0.000	
Treatment * chronic illness				0.021				-0.004
District fixed effect	YES	YES	YES	YES	YES	YES	YES	YES
Number of observations	3,697	3,697	3,697	3,697	3,643	3, 643	3, 643	3, 643
Adjusted R2	0.123	0.125	0.124	0.123	0.098	0.101	0. 098	0. 098
F-test of joint significance		3.36**	15.30***	3.89***		2.17*	16.20***	0.60

Note: *** p<0.01; ** p<0.05; * p<0.1. . The number in brackets shows standard errors.

Estimation methodology matters—household vs. individual matching

Females: participation in any wage labour activity

- Change in significance
- Switched sign in chronic illness

Impact on wage labour participation by adults (age >18) by **females**

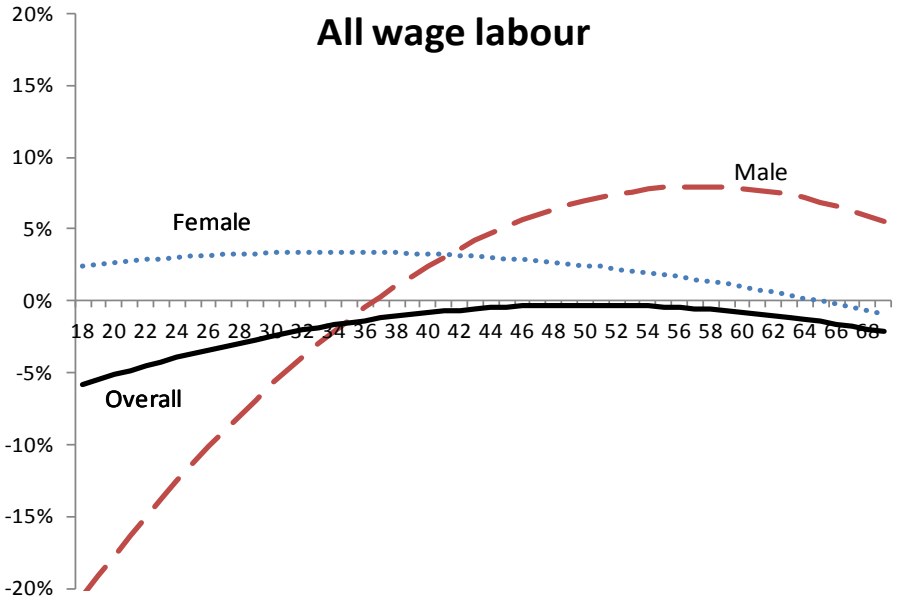
	Household level weighting				Individual level weighting			
	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4
Treatment	-0.060*	-0.100***	-0.236*	-0.072*	0.017	-0.009	-0.007	0.022*
Treatment * distance to market		0.197***				0.132*		
Treatment * age			0.007				0.002	
Treatment * age squared			-0.000				-0.000	
Treatment * chronic illness				0.050				-0.026
District fixed effect	YES	YES	YES	YES	YES	YES	YES	YES
Number of observations	2,136	2,136	2,136	2,136	1,743	1,743	1,743	1,743
Adjusted R2	0.126	0.130	0.126	0.126	0.117	0.119	0.116	0.117
F-test of joint significance		4.12***	7.94***	2.45*		2.51*	7.83***	0.26

Note: *** p<0.01; ** p<0.05; * p<0.1. . The number in brackets shows standard errors.

Impact on wage labour participation by age and sex of adult individuals

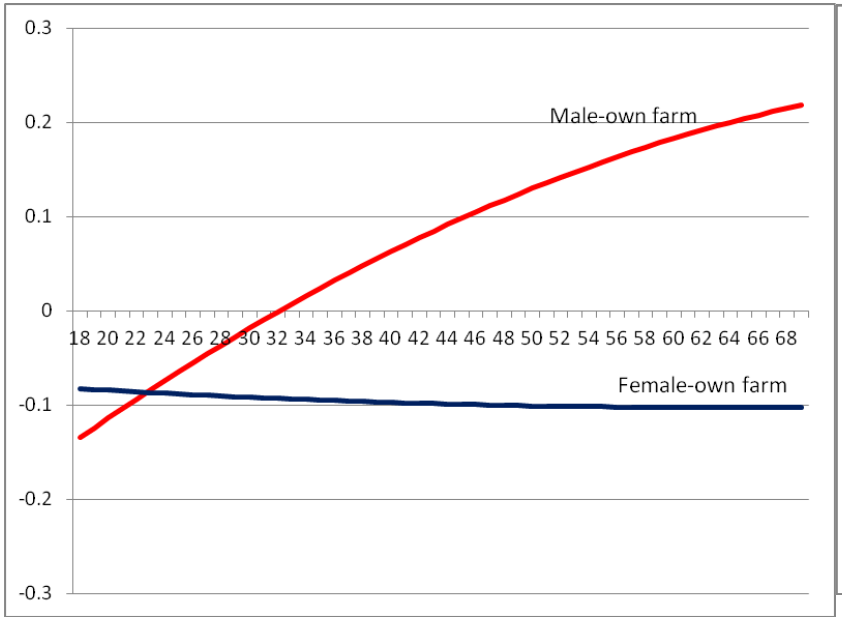
(i) Household level weighting

(ii) Individual level weighting

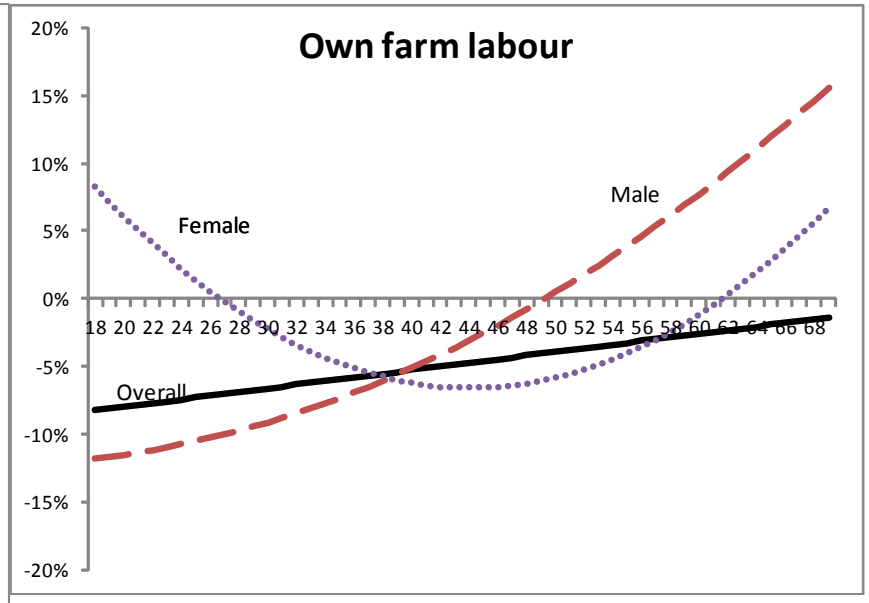


Impact on own farm labour participation by age and sex of adult individuals

(i) Household level weighting



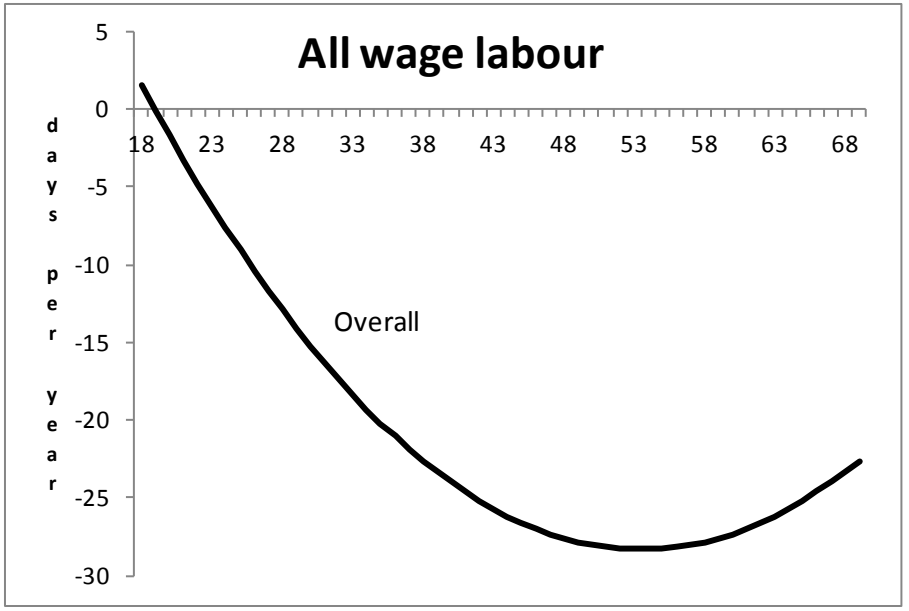
(ii) Individual level weighting



Impact on intensity of wage labour

(i) Household level weighting

(ii) Individual level weighting



Impact on intensity of own farm labour by age and sex of adult individuals

(i) Household level weighting

(ii) Individual level weighting