Labor Supply Elasticity in a Job Matched Platform –Empirical Evidence from Matched Farmworker-Farm Data

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Labor Supply Elasticity in a Job Matched Platform –Empirical Evidence from Matched Farmworker-Farm Data

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Overview

This paper estimates labor supply elasticity of farmworkers in an online job matched platform in Taiwan. To cope with endogeneity of hourly wage and platform externality on hours of work, we estimate instrumental variable fixed effect models. We control for farm and farmworker fixed effects and the endogeneity of wage and platform externality. Moreover, we find evidence to support the income targeting hypothesis which indicates that farmworkers with piece-rate scheme stopped working when the targeted level of income is reached.

Introduction of the platform

- To mitigate farm labor shortage problem, Taiwanese government launched and sponsored a job-matched digital platform in April of 2017.
- Wage salary is negotiated between farms and workers.
- Government pays additional subsidies (flat rate per hour) and provides training programs to farmworkers.
- Operation of the platform:

Farms (demand) → Platform ← Farmworkers (supply)

Objectives

- Estimate labor supply responses of farmworkers in a job matched with a piece rate scheme of farm labor.
- Highlight the role of platform externality on the estimation of labor supply response.
- Test the income targeting hypothesis in a job matched online platform for farmworkers.

Data

- Construct a matched farm-farmworker panel data using an administrative data.
- Include all successful matched pieces of jobs between April 1, 2017 and December 31, 2020 with detailed information of farm, farmworker and job characteristics.
- In total, 92,210 pieces of jobs (5,644 farms and 2,059 farmworkers).
- [Key variables] Hour: working hours per job; Wage: hourly wage; Externality: diversity of farms on the platform per township per month
- [Control] Other variables: meal, job type dummy var.

Result

1. Hour equation without externality

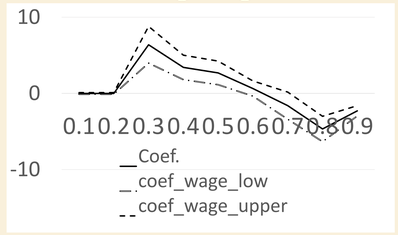
	FE model		IV-FE model			
	Hour equation		Wage equation		Hour equation	
Variable	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.
IVW			0.455***	0.024		
log(wage)	1.063**	0.474			0.895*	0.475
Other variables	Yes		Yes		Yes	
Weak IV test			362.91			
Adjusted R^2	0.601		0.987		0.601	
# of jobs	92,210					

2. Bargaining power

Equation	Hour	
Panel A. unobserved farm factors		
variable	Coef.	S.E.
Fruit	-0.864***	0.109
Vegetable	-0.408***	0.109
Rice	-0.751***	0.116
Flower	-0.560***	0.135
Mushroom	-0.400**	0.157
Tea	0.253*	0.130
Other crop	-0.632***	0.112
Constant	-0.095	0.107
# of farms	5,644	
Adjusted R^2	0.065	

Equation	Hour	
Panel B. unobserved worker factors		
Variable	Coef.	S.E.
Male	-0.036	0.029
Junior	0.008	0.070
Senior	0.050	0.064
College	0.065	0.065
Age2534	0.040	0.063
Age3544	0.014	0.063
Age4564	0.004	0.065
Age5564	0.020	0.067
Age65	0.004	0.091
Train_long	-0.323*	0.186
Train_short	0.087	0.071
Em_self-farm	-0.037	0.116
Em_hired	-0.099	0.109
Em_non-farm	-0.112	0.109
Constant	0.158	0.127
# of workers	2,059	
Adjusted R^2	-0.001	

4. Income targeting



3. Hour equation with externality

	FE model		IV-FE model			
			Externality equation		Outcome equation	
Variable	Coef.	S.E	Coef.	S.E	Coef.	S.E
IVE			0.837***	0.029		
Externality	0.268***	0.036			0.570***	0.096
Elasticity					**0.453**	
log(wagehat)	0.762*	0.453	-0.268***	0.076	0.613**	0.253
Weak IV test			830.27			
Endogeneity test					9.897(p=	0.002)
Adjusted R^2	0.602		0.825		0.017	
# of jobs	92,210					

Empirical Method

1. Hour equation without platform externality

- With exogenous wage rate: the Fixed Effect Model

$$\log(H_{ipfct}) = \alpha_0 + \gamma_0 \times \log(W_{ipfct}) + \beta_0' X_{ipfct} + u_p + u_f + u_t + v_{0ipfct}$$

H_{ipfct} is the hours of work for the i[th] job for farmworker p in farm f that is located in township c and time t

- With endogenous wage rate: the IV-FE Model

$$\log(W_{ipfct}) = \alpha_1 + \gamma_1 \times \log(IVW_{ipfct}) + \beta_1' X_{ipfct} + u_p + u_f + u_t + v_{1ipfct}$$
$$\log(H_{ipfct}) = \alpha_2 + \gamma_2 \times \log(\widehat{W}_{ipfct}) + \beta_2' X_{ipfct} + u_p + u_f + u_t + v_{2ipfct}$$

IVW_{ipfct} : Farm specific average paid-wage rate per day (NT$/hour).

2. Bargaining power: farm/farmworker fixed effects on time invariant factors $\hat{u}_f = \theta_1 + \eta_1' K_f + \varepsilon_{1ipcft}$ / $\hat{u}_p = \theta_2 + \eta_2' K_p + \varepsilon_{2ipcft}$

3. Hour equation with platform externality

- With exogenous platform externality: the FE Model

$$\log(H_{ipfct}) = \alpha_3 + \gamma_3 \times \log(W_{ipfct}) + \delta_3 \times E_{ipfct} + \beta_3' X_{ipfct} + u_p + u_f + u_t + v_{3ipfct}$$

- With endogenous platform externality: the IV-FE Model

$$\log(E_{ipfct}) = \alpha_4 + \gamma_4 \times \log(\widehat{W}_{ipfct}) + \delta_4 \times IVE_{ipfct} + \beta_4' X_{ipfct} + u_p + u_f + u_t + v_{4ipfct}$$
$$\log(H_{ipfct}) = \alpha_5 + \gamma_5 \times \log(\widehat{W}_{ipfct}) + \delta_5 \times \hat{E}_{ipfct} + \beta_5' X_{ipfct} + u_p + u_f + u_t + v_{5ipfct}$$

IVE_{ipfct}: Average externality cumulated to the previous months

4. Income targeting: unconditional quantile regression model

To test whether the labor supply elasticities can be negative for hours that are located in the higher percentiles of the hour distribution

Conclusion

1. Our estimated farmworker labor supply elasticity is 0.895, which is larger than previous studies in a non-platform setup (0.05-0.27, see Hill et al. 2020).
2. Bargaining power on hourly wage and hours of work are toward farms rather than farmworkers.
3. Platform externality is positively associated with hours of work and makes farmworkers less responsive to hourly wage.
   - With the consideration of platform externality and its endogeneity, the estimated elasticity of hour to wage is 0.613.
4. Income targeting hypothesis is evident in our case, suggesting that the elasticity of hours with respect to wage is negative for farmworkers receiving large salaries.

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