Online Appendix

"Liquidity Constraints, Spillovers, and Entrepreneurship: Direct and Indirect Effects of a Cash Transfer Program'

May 4, 2018

A IV with a Cluster-Level Instrument

Proposition A.1. *Let z_{ivt} be an instrumental variable. If the period-cluster conditional variance of z_{ivt} is zero, $Var\left(z_{ivt}|v,t\right)=0$, then the IV estimator for τ in equation (4.2) is equivalent to the IV estimator for τ in the following equation:*

$$y_{ivt}=\beta_0+\tau d_{ivt}+\mu_v+\mu_t+u_{ivt}. \tag{A.1}$$

Proof. Let y^*_{ivt}, d^*_{ivt}, and $\overline{d}^*_{vt}$ be cluster-period mean-centered versions of y_{ivt}, d_{ivt}, and $\overline{d}_{vt}$, respectively.

Suppose equation (4.1) is the true equation, but we instead estimate the following model:

$$y_{ivt}=\beta_0+\beta_1 d_{ivt}+\mu_v+\mu_t+u_{ivt}, \tag{A.2}$$

in which $\overline{d}_{vt}$ is omitted.

Let z_{vt} be an instrumental variable such that $Var\left(z_{vt}|v,t\right)=0$. Then the (within-group) IV estimator for β_1 in equation (A.2) is:

$$\begin{aligned}\widehat{\beta}_1^{IV} &= \frac{\sum_{ivt} z^*_{vt}y^*_{ivt}}{\sum_{ivt} z^*_{vt}d^*_{ivt}}\\ &= \frac{\sum_{ivt} z^*_{vt}y^*_{ivt}}{\sum_{vt} z^*_{vt}\sum_i d^*_{ivt}}\\ &= \frac{\sum_{ivt} z^*_{vt}y^*_{ivt}}{\sum_{ivt} z^*_{vt}\overline{d}^*_{vt}}=\widehat{\tau}^{IV}.\end{aligned}$$

Thus the formula is exactly the same as if we estimate equation (4.2) using z_{vt} as an instrumental variable. Using similar steps as in Proposition 4.1, we can show that $\widehat{\tau}^{IV}$, as well as $\widehat{\beta}_1^{IV}$, is a consistent estimator for the overall effect, $(\beta_1+\beta_2)$. ■

Table B1: Poverty Headcount and Program Coverage

	2001			2004			2006		
	Total	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural
Poverty headcount	0.301	0.250	0.579	0.285	0.241	0.534	0.225	0.183	0.466
Program coverage	0.064	0.044	0.174	0.178	0.146	0.360	0.227	0.188	0.450
Share of benefits		0.599	0.401		0.686	0.314		0.708	0.292
Number of obs.	368,605	316,793	51,812	378,658	326,322	52,336	389,807	336,502	53,305

Estimates are obtained using PNAD. 'Poverty headcount' is measured by the proportion of people with household per capita income below the poverty line (half of the 2001 minimum wage). 'Program coverage' is measured by the proportion of people participating in the program. 'Share of benefits' is the ratio between the total amount of transfers going to either urban or rural areas and the total amount of transfers distributed by CCT programs in the country.

Table B2: Number of Observations per Municipality

	Mean	Std. Dev.	Min.	Max.	Number of municipalities
2001					
Number of households	128.1	290.4	19	3,505	796
Sample size	52.4	128.1	5	1,571	796
2004					
Number of households	136.8	305.1	23	3,575	796
Sample size	54.3	131.8	5	1,751	796
2006					
Number of households	143.8	322.7	28	3,884	796
Sample size	56.4	136.1	5	1,753	796

The sample comprises men aged between 25 and 45 years old, with no college degree, and living in urban areas. This sample also excludes public servants and employers with more than five employees.

Table B3: Overall Effect of Cash Transfers on Different Types of Business

	Decision of being a small entrepreneur in					
	Services		Sales		Manufacturing	
	FE	IV	FE	IV	FE	IV
	(1)	(2)	(3)	(4)	(5)	(6)
program coverage, $\overline{d}$	0.040***	0.056***	0.007	0.015	0.010	0.006
	(0.012)	(0.017)	(0.009)	(0.013)	(0.008)	(0.011)
age (x10)	0.031***	0.031**	0.023**	0.023**	0.001	0.001
	(0.012)	(0.012)	(0.012)	(0.012)	(0.010)	(0.010)
squared age (x100)	-0.002	-0.002	-0.001	-0.001	0.002	0.002
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
white	0.016***	0.015***	0.015***	0.015***	0.006***	0.006***
	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)
black	-0.006***	-0.006***	-0.005***	-0.005***	-0.005***	-0.005***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)
married	0.000	0.000	0.012***	0.012***	0.006***	0.006***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
elementary education	0.011***	0.011***	0.011***	0.011***	0.008***	0.008***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
primary education	0.012***	0.012***	0.015***	0.015***	0.003*	0.003*
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
high school	0.022***	0.022***	0.013***	0.013***	-0.002	-0.002
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
log of population	-0.010	-0.011	-0.015	-0.015	0.002	0.002
	(0.011)	(0.011)	(0.010)	(0.009)	(0.008)	(0.008)
year = 2001	0.020***	0.023***	-0.009***	-0.008***	-0.002	-0.003
	(0.003)	(0.004)	(0.002)	(0.003)	(0.002)	(0.002)
year = 2004	0.001	0.001	0.000	0.001	-0.001	-0.001
	(0.001)	(0.001)	(0.002)	(0.002)	(0.001)	(0.001)
Municipality Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	112,117	112,117	112,117	112,117	112,117	112,117

***, **, * represent statistical significant at the 1%, 5% and 10% levels, respectively. Standard errors in parentheses are clustered by municipality. Sample includes only men with high school diploma or less. FE columns present the fixed-effect regressions obtained using the within-group method. IV columns present the fixed-effect, Instrumental-Variable regressions with 'program coverage' instrumented by the interactions between municipal quotas and year dummies.

Table B4: Indirect and Direct Effects on Entrepreneurship, With and Without Children

	Decision of being a small entrepreneur			
	Without children		With children	
	FE	IV	FE	IV
	(1)	(2)	(3)	(4)
program coverage, $\overline{d}$	0.028	0.044	0.090***	0.112***
	(0.021)	(0.029)	(0.025)	(0.030)
individual benefit, d	-0.013***	-0.013***	-0.050***	-0.058***
	(0.005)	(0.005)	(0.009)	(0.012)
age (x10)	0.071**	0.071**	0.062**	0.062**
	(0.029)	(0.029)	(0.028)	(0.028)
squared age (x100)	-0.004	-0.004	-0.002	-0.002
	(0.004)	(0.004)	(0.004)	(0.004)
white	0.031***	0.031***	0.037***	0.037***
	(0.002)	(0.002)	(0.003)	(0.003)
black	-0.010**	-0.010**	-0.021***	-0.021***
	(0.004)	(0.004)	(0.004)	(0.004)
married	0.027***	0.027***	0.028***	0.028***
	(0.002)	(0.002)	(0.003)	(0.003)
elementary education	0.027***	0.027***	0.029***	0.028***
	(0.003)	(0.003)	(0.003)	(0.003)
primary education	0.027***	0.027***	0.029***	0.029***
	(0.003)	(0.003)	(0.004)	(0.004)
high school	0.029***	0.029***	0.031***	0.031***
	(0.003)	(0.003)	(0.004)	(0.004)
log of population	0.002	0.001	-0.064***	-0.065***
	(0.022)	(0.022)	(0.023)	(0.023)
year = 2001	0.004	0.006	0.001	0.005
	(0.005)	(0.006)	(0.006)	(0.007)
year = 2004	-0.002	-0.001	-0.002	-0.001
	(0.003)	(0.003)	(0.004)	(0.004)
Municipality Fixed-Effects	Yes	Yes	Yes	Yes
N. of obs. - all sample	63,348	63,348	65698	65698
N. of obs. - $d = 0$	60,630	60,630	52,458	52,458

***, **, * represent statistical significant at the 1%, 5% and 10% levels, respectively. Sample includes only men with high school diploma or less. Standard errors in parentheses are clustered by municipality. All coefficients are estimated using Seemingly Unrelated Regressions (SUR). The indirect effect (program coverage) is estimated using the sample of non-participants, whereas the direct effect (individual benefit) is estimated using all sample and bias corrected according to Lemma 4.1. Columns (1) and (2) present the estimates of effects on individuals without children in their household. Columns (3) and (4) present the estimates of effects on individuals living with children under 15 years old. The FE column shows the fixed-effect regression obtained using the within-group method. The IV column shows fixed-effect, Instrumental-Variable regression with 'program coverage' instrumented by the interactions between municipal quotas and year dummies.

Table B5: Indirect and Direct Effects on Occupational Choices, With and Without High School

Panel A: Individuals without High-School Diploma					
	Fixed-Effect Model				
	Entrep.	Jobless	Formal employee	Informal employee	Informal self-emp.
program coverage, $\overline{d}$	0.05***	0.023	0.04	-0.087**	-0.025
	(0.016)	(0.026)	(0.035)	(0.034)	(0.035)
individual benefit, d	-0.038***	0.035***	-0.044***	0.026*	0.021
	(0.006)	(0.011)	(0.014)	(0.014)	(0.015)
Municipality Fixed-Effects	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes
Individual covariates	Yes	Yes	Yes	Yes	Yes
N. of obs. - all sample	90,648	90,648	90,648	90,648	90,648
N. of obs. - $d = 0$	76,566	76,566	76,566	76,566	76,566
	Instrumental-Variable Model				
	Entrep.	Jobless	Formal employee	Informal employee	Informal self-emp.
program coverage, $\overline{d}$	0.064***	0.055	-0.007	-0.109***	-0.004
	(0.022)	(0.034)	(0.047)	(0.041)	(0.045)
individual benefit, d	-0.043***	0.043***	-0.051***	0.01	0.042**
	(0.007)	(0.016)	(0.018)	(0.019)	(0.021)
Municipality Fixed-Effects	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes
Individual covariates	Yes	Yes	Yes	Yes	Yes
N. of obs. - all sample	90,648	90,648	90,648	90,648	90,648
N. of obs. - $d = 0$	76,566	76,566	76,566	76,566	76,566
Panel B: Individuals with High-School Diploma					
	Fixed-Effect Model				
	Entrep.	Jobless	Formal employee	Informal employee	Informal self-emp.
program coverage, $\overline{d}$	0.086*	0.017	-0.037	-0.014	-0.052
	(0.047)	(0.048)	(0.073)	(0.035)	(0.039)
individual benefit, d	-0.039***	0.03**	-0.053**	0.029**	0.034**
	(0.011)	(0.013)	(0.021)	(0.014)	(0.015)
Municipality Fixed-Effects	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes
Individual covariates	Yes	Yes	Yes	Yes	Yes
N. of obs. - all sample	38,398	38,398	38,398	38,398	38,398
N. of obs. - $d = 0$	36,522	36,522	36,522	36,522	36,522
	Instrumental-Variable Model				
	Entrep.	Jobless	Formal employee	Informal employee	Informal self-emp.
program coverage, $\overline{d}$	0.103*	0.003	-0.053	0.008	-0.061
	(0.056)	(0.054)	(0.082)	(0.045)	(0.051)
individual benefit, d	-0.038***	0.026	-0.04*	0.011	0.041**
	(0.012)	(0.017)	(0.024)	(0.017)	(0.018)
Municipality Fixed-Effects	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes
Individual covariates	Yes	Yes	Yes	Yes	Yes
N. of obs. - all sample	38,398	38,398	38,398	38,398	38,398
N. of obs. - $d = 0$	36,522	36,522	36,522	36,522	36,522

***, **, * represent statistical significant at the 1%, 5% and 10% levels, respectively. Standard errors in parentheses are clustered by municipality. All coefficients are estimated using Seemingly Unrelated Regressions (SUR). The indirect effect (program coverage) is estimated using the sample of non-participants, whereas the direct effect (individual benefit) is estimated using all sample and bias corrected according to Lemma 4.1. Fixed-Effect models are estimated using the within-group method. In the Instrumental-Variable models, 'program coverage' is instrumented by the interactions between municipal quotas and year dummies.