# MAJOR PROJECT ELV781-ML For Econometrics

# ANGRIST & EVANS: CHILDREN AND THEIR PARENTS' LABOR SUPPLY

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#### 1 PROBLEM STATEMENT

Analysis related to the paper "Children and their Parents Labour Supply (Angrist and Evans, 1998)"

ML application in the paper GENERALIZED RANDOM FORESTS (Susan Athey, Julie Tibshirani and Stefan Wager, 2018)

**Data**: Use SAS dataset for the project

Variables for analysis using causal forests (Y, X, W)

- 1. Calculate means and standard deviations for Yi, Xi, Wi
  - Check if you have the right sample by comparing your descriptive statistics against those in Table 2 and 6 of Angrist and Evans
- 2. OLS estimation of Yi on X's and W
  - Results should line up with columns 1, 4 and 7 of Table 7.
  - OLS does not take into account endogenity of Wi (non-random treatment assignment of treatment i.e. fertility decision). So results cannot be interpreted as causal effects.
- 3. Run causal forest for each Yi
  - Causal tree helps us analyze heterogeneity in a parameter (the effect of a variable).
  - Causal trees do not take into account endogeneity of Wi (non-random treatment assignment of treatment i.e. fertility decision). So results cannot be interpreted as showing causal effects but the exercise will help you learn how to implement causal trees.
- 4. Optional: IV estimation of Yi on X's, W, Z
  - Zi = "same sex" is an indicator variable that takes on value 1 if the first two children have the same gender
  - Results should line up with columns 2, 5 and 8 of Table 7.

Analysis: Restrict analysis to 1980 data

#### 2 RESULTS

Created the variables(Yi,Xi,Wi) for covariates, instruments, dependent variables using corresponding code in python. We calculated the descriptive statistics(means) for these variables as shown in table 1.

- The samples include women aged 21-35 with 2 or more children except for women whose second child is less than a year old.
- In the 1980 PUMS, the married women sample refers to women who were married at the time of their first birth, married at the time of the survey, and married once
- Comparing our results (table 1) against those in table 2 of Angrist and Evans

Table 1: DESCRIPTIVE STATISTICS, WOMEN AGED 21-35 WITH 2 OR MORE CHILDREN

Variable         All Womens         Married Women Wives         Husband           Children ever born         2.5526         2.5081         —           More than 2 children (= 1 if mother had more than 2 children, =0 otherwise)         0.4022         0.3806         —           Boy 1st (S1) (= 1 if first child was a boy)         0.5111         0.5144         —           Boy 2nd (S2) if second child was a boy)         0.5109         0.5124         —           Two boys (= 1 if first two children were boys)         0.2637         0.2660         —           Two girls (= 1 if first two children were girls)         0.2415         0.2391         —           Same sex (= 1 if first two children were the same sex)         0.5052         0.5052         —           Twins-2 (= 1 if second birth was a twin)         0.0085         0.0083         —           Age         30.123         30.391         33.034           Age atfirst birth (parent's age in years when first child was born)         20.137         20.829         23.977           born)         Worked for pay (= 1 if worked for pay in year prior to census)         0.5654         0.5282         0.9768           Weeks worked (weeks worked in year prior to census)         18.800         16.700         43.487           Labor income (labor earnings in year prior to censu	Means				
Children ever born       2.5526       2.5081       -         More than 2 children (= 1 if mother had more than 2 children, =0 otherwise)       0.4022       0.3806       -         Boy 1st (S1) (= 1 if first child was a boy)       0.5111       0.5144       -         Boy 2nd (S2) if second child was a boy)       0.5109       0.5124       -         Two boys (= 1 if first two children were boys)       0.2637       0.2660       -         Two girls (= 1 if first two children were girls)       0.2415       0.2391       -         Same sex (= 1 if first two children were the same sex)       0.5052       0.5052       -         Twins-2 (= 1 if second birth was a twin)       0.0085       0.0083       -         Age       30.123       30.391       33.034         Age atfirst birth (parent's age in years when first child was born)       20.137       20.829       23.977         born)       Worked for pay (= 1 if worked for pay in year prior to census)       0.5654       0.5282       0.9768         Weeks worked (weeks worked in year prior to census)       18.800       16.700       43.487         Labor income (labor earnings in year prior to census, in 1995 dollars)       7,161       6,252       38,910         Family income (family income in year prior to census, in 1995 dollars)       42,328 <td< td=""><td></td><td></td><td colspan="3">Married Women</td></td<>			Married Women		
More than 2 children (= 1 if mother had more than 2 children, =0 otherwise)       0.4022       0.3806       -         Boy 1st (S1) (= 1 if first child was a boy)       0.5111       0.5144       -         Boy 2nd (S2) if second child was a boy)       0.5109       0.5124       -         Two boys (= 1 if first two children were boys)       0.2637       0.2660       -         Two girls (= 1 if first two children were girls)       0.2415       0.2391       -         Same sex (= 1 if first two children were the same sex)       0.5052       0.5052       -         Twins-2 (= 1 if second birth was a twin)       0.0085       0.0083       -         Age       30.123       30.391       33.034         Age atfirst birth (parent's age in years when first child was born)       20.137       20.829       23.977         born)       Worked for pay (= 1 if worked for pay in year prior to census)       0.5654       0.5282       0.9768         Weeks worked (weeks worked in year prior to census)       18.800       16.700       43.487         Labor income (labor earnings in year prior to census, in 1995 dollars)       7,161       6,252       38,910         Family income (family income in year prior to census, in 1995 dollars)       42,328       47,639       -         Non-wife income (family income minus wife's labor incom	Variable	All Womens	Wives	Husband	
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Boy 1st (S1) (= 1 if first child was a boy)	More than 2 children (= 1 if mother had more than 2 chil-	0.4022	0.3806	_	
Boy 2nd (S2) if second child was a boy   0.5109   0.5124   —	dren, =0 otherwise)				
Two boys (= 1 if first two children were boys)       0.2637       0.2660       —         Two girls (= 1 if first two children were girls)       0.2415       0.2391       —         Same sex (= 1 if first two children were the same sex)       0.5052       0.5052       —         Twins-2 (= 1 if second birth was a twin)       0.0085       0.0083       —         Age       30.123       30.391       33.034         Age atfirst birth (parent's age in years when first child was born)       20.137       20.829       23.977         Worked for pay (= 1 if worked for pay in year prior to census)       0.5654       0.5282       0.9768         Weeks worked (weeks worked in year prior to census)       20.833       19.019       47.951         Hours/week (average hours worked per week)       18.800       16.700       43.487         Labor income (labor earnings in year prior to census, in 1995 dollars)       7,161       6,252       38,910         Family income (family income in year prior to census, in 1995 dollars)       42,328       47,639       —         Non-wife income (family income minus wife's labor income,       —       41,628       —	Boy 1st $(S1)$ (= 1 if first child was a boy)	0.5111	0.5144	_	
Two girls (= 1 if first two children were girls)       0.2415       0.2391       -         Same sex (= 1 if first two children were the same sex)       0.5052       -         Twins-2 (= 1 if second birth was a twin)       0.0085       0.0083       -         Age       30.123       30.391       33.034         Age atfirst birth (parent's age in years when first child was born)       20.137       20.829       23.977         Worked for pay (= 1 if worked for pay in year prior to census)       0.5654       0.5282       0.9768         Weeks worked (weeks worked in year prior to census)       20.833       19.019       47.951         Hours/week (average hours worked per week)       18.800       16.700       43.487         Labor income (labor earnings in year prior to census, in 1995 dollars)       7,161       6,252       38,910         Family income (family income in year prior to census, in 1995 dollars)       42,328       47,639       -         Non-wife income (family income minus wife's labor income,       -       41,628       -	Boy 2nd (S2) if second child was a boy)	0.5109	0.5124	_	
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	1995 dollars)				
in 1995 dollars)	Non-wife income (family income minus wife's labor income,	_	41,628	_	
	in 1995 dollars)				

• Comparing our descriptive statistics against those in Table 6 of Angrist and Evans

Table 2: OLS ESTIMATES OF MORE THAN 2 CHILDREN EQUATIONS

	All Women		Married Women		ien	
Independent	(1)	(2)	(3)	(4)	(5)	(6)
Variable						
Boy 1st	_	-0.0079	_	_	-0.0109	(6)
Boy 2nd	_	-0.00897	_	_	-0.0105	_
Same sex	0.0595	0.0610	_	0.0664	0.0682	_
Two boys	_	_	_	_	_	_
Two girls	_	_	_	_	_	_
With other co-	_	_	_	_	_	_
variates						

• Our OLS estimation of Yi on X's and W are reported in table 3. (Results also lined up with columns 1, 4 and 7 of Angrist & Evans paper Table 7)

Table 3: OLS ESTIMATES OF LABOR-SUPPLY MODELS USING 1980 CENSUS DATA

Estimates of the coefficient on the More than 2 children variable						
Dependent Variable	All Women	Married	Husbands of			
		Women	married women			
Worked for pay	-0.17366	-0.1627	-0.00905			
Weeks worked	-8.7912	-7.8383	-0.9226			
Hours/week	-6.4423	-5.7529	0.02859			
Labor income	-3624.60	-3011.00	-1475.97			
ln(Family income)	-0.1653	-0.1527	_			
ln(Non-wife income)	_		_			

### 3 REFERENCES

- 1. Angrist and Evans (1998): Children and Their Parents' Labor Supply: Evidence from Exogenous Variation in Family Size link here
- 2. SAS dataset Reference at click here
- 3. Linear models python models reference: linear models link
- 4. This is link for latex tutorial: LaTeX-Tutorial.