ASAP Assignment 2

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1 Difference in Difference

Description: You are tasked with estimating the effects of the 1993 policy intervention on labor supply for single women by whether or not they had children. –¿ The relevant varibales in this case are: state - US-State/ provice of residence year - Year urate - US-State/province unemployment rate children - number of children per women nonwhite - nonwhite finc - annual family income earn - anual earnings (of women) age - age of women ed - Years of education work - Indicator work status (employed or not) unearn - unearn Income

Outcome variable: INDICATOR WORK STATUS Time indicator: at 1993 (beginning) create time variable Goal: estimate the effect of the 1993 policy intervention on labor supply for single women by whether or not they had children (Dummy for whether they had children or not??)

The unit of analysis are females in the US

Question: The main predictor is meant to be whether women has children; Should we use that as a dummy or numeric variable?? –¿ something like degree of treatment

1.1 Indicate which of the coefficients(s) from equation (1) yield the following outcomes

NOte possibly delete duplicates SEE SLIDE 57 ff

Important: we canot identify the monthrs; so If they become mothers at some point, we will assume that these are taken out!

$(1) y_{it} = \beta_0 + \beta_1 + \beta_2 + \beta_3 D_i T_t + \epsilon_{it}$

$E = (y_{T=1}|D = 1)$ $E = (y_{T=0}|D = 1)$ $E = (y_{T=1}|D = 0)$ $E = (y_{T=0}|D = 0)$

$[E(y_{T=1}|D = 1) - E(y_{T=0}|D = 1)] - [E(y_{T=1}|D = 0) - E(y_{T=0}|D = 0)]$

1.2 Task 2: Provide graphic as on slide 55

IMPORTANT: ALSO MENTION THE CATEGORICAL VARIABLES!!!

NOTES: This "visoual" proof is no real proove; this is just visual confirmation of what we assume; but does this really pertain to the case that the TAX credit is the real cause? What about the case of subsections of the population? and we still do not know whether this is really causal and not like the economy heating up¡ Predictor is WHETHER YOU HAVE CHILD OR NOT

1.3 Task 3: Summary Statistics for data

Table 1: Descriptive Statistics of Numeric Indepdenent and Dependent Varaible

Statistic	Mean	St. Dev.	Min	Pctl(25)	Median	Pctl(75)	Max
Family Income	15,255.320	19,444.250	0.000	5,123.418	9,636.664	18,659.180	575,616.800
Earnings	10,432.480	18,200.760	0.000	0.000	3,332.180	14,321.220	537,880.600
Age	35.210	10.157	20	26	34	44	54
Education	8.806	2.636	0	7	10	11	11
Education Years	4.823	7.123	0.000	0.000	2.973	6.864	134.058
Unearned Income	1.193	1.382	0	0	1	2	9
Count Children	0.513	0.500	0	0	1	1	1

Notes: N = 13746

1.4 Task 4: Matrix Diff in Diff

NOte: by taking the average of the periods we have two small problems: 1) the AFTER period is longer; so should we really do that?

1.5 Task 5: Analyze the DiD effect with appropriate regression models for the three dependent variables

Table 2: Descriptive Statistics of ECIC; With Children

Statistic	Mean	St. Dev.	Min	Pctl(25)	Median	Pctl(75)	Max
Family Income	12,750.390	15,739.050	0.000	4,652.465	8,425.197	15,218.720	410,507.600
Earnings	7,909.934	14,956.930	0.000	0.000	1,110.727	11,107.270	366,095.500
Age	32.717	8.630	20	25	32	39	54
Education	9.001	2.408	0	7	10	11	11
Education Years	4.840	5.872	0.000	0.071	3.761	7.070	102.958
Unearned Income	2.097	1.209	1	1	2	3	9
Count Children	0.466	0.499	0	0	0	1	1

Notes: N = 7819

Table 3: Descriptive Statistics of ECIC; Without Children

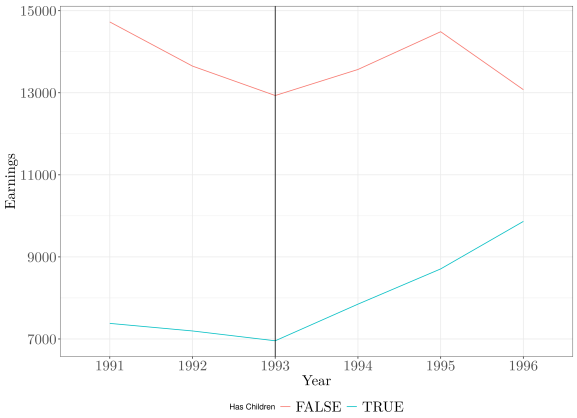
Statistic	Mean	St. Dev.	Min	Pctl(25)	Median	Pctl(75)	Max
Family Income	18,559.860	23,041.780	0.000	5,793.092	11,912.950	24,391.010	575,616.800
Earnings	13,760.260	21,301.400	0.000	0.000	7,664.014	19,447.610	537,880.600
Age	38.498	11.046	20	28	40	49	54
Education	8.549	2.889	0	7	10	11	11
Education Years	4.800	8.496	0.000	0.000	1.248	6.528	134.058
Unearned Income	0.000	0.000	0	0	0	0	0
Count Children	0.574	0.494	0	0	1	1	1

Notes: N = 5927

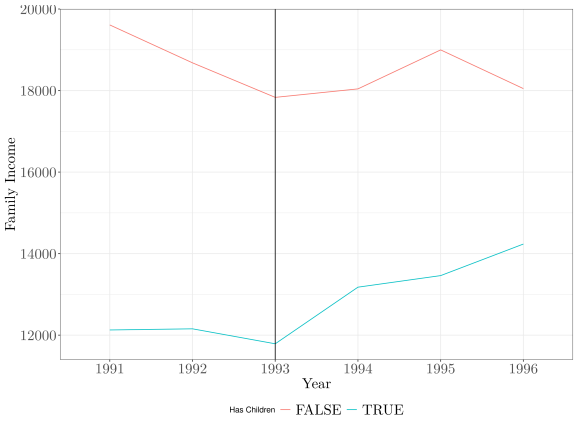
Table 4: Diff-in-Diff Matrix

		Earning		Family Income		Work Participation	
	dperiod	Childless	Has Child	Childless	Has Child	Childless	Has Child
Before	1	14,203.900	7,290.380	19,159.190	12,140.900	0.580	0.450
After	2	13,507.900	8,277.200	18,218.950	13,111.690	0.570	0.480
Difference		-696.000	986.810	-940.240	970.800	-0.010	0.030

Notes: N = 5927 Childless; N = 7819 Has one or more Children



(a) Annual Earnings by Females with(out) Children



(b) Family Earnings Earnings by Females with(out) Children

(c) Work Participation by Females with(out) Children

Figure 1: Pre-Post Intervention of EICT Credit for Women with(out) Children

NOTE STANDARDIZED COEFFICIENTS ARE NOT REPORTED AS THEY ARE USELESS IN THIS CONTEXT; WE ARE NOT LOOKIGN FOR EFFECT SIZE BUT RATHER THE CASE OF

Note:standardized coefficinets will NOT be included as they are of no interpretable interest here and there is no real effect size we want to estimate in the first place.

Also: give a short theroy for why control variables were included! LOOK AT PQRM QUANTITATIVE CORUSE AT UVA; THEY CALLED IT SOMETHING SPECIAL!

IMPORTANT: EXPLAIN WHY IN CERTAIN MODELS THE CONTROL VARIABLES WORK AND WHY THEY DONT WORK IN OTHER MODELS!! Build a theory in this regard

NOTE ROBUST STANDARD ERROS MIGHT NOT EVEN BE NEEDED IN THIS CASE DUE TO THE THEORY BEHIND DIFF IN DIFF

NOTE: WRITE A THEORY FOR EACH CONTROL VARIBALE REGARDING EACH DEPEDNET: EG THE urate may not ahve a controllign effect on earnings but it may have on family income

Table 5: Non-Robust Regression Results Part 3

	Dependent variable:					
	earn		finc		work	
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	14,899.900***	12,958.640***	20,099.430***	16,218.430***	0.582***	0.532***
	(828.375)	(1,550.012)	(886.522)	(1,655.347)	(0.023)	(0.043)
has_children1	−8,596.327***	−8,394.973***	−8,929.330***	−8,269.567***	−0.159***	−0.150***
	(1,093.444)	(1,096.506)	(1,170.197)	(1,171.022)	(0.030)	(0.030)
dperiod	−695.997	−536.491	−940.239*	−515.553	−0.005	−0.024*
	(485.413)	(500.046)	(519.486)	(534.028)	(0.013)	(0.014)
age		22.555		78.717***		0.002***
		(15.922)		(17.004)		(0.0004)
urate		133.948		372.861***		−0.018***
		(114.614)		(122.403)		(0.003)
ed		66.337		−125.305**		0.017***
		(59.579)		(63.628)		(0.002)
nonwhite1		−1,255.622***		−2,438.387***		−0.043***
		(326.237)		(348.408)		(0.009)
has_children1:dperiod	1,682.810***	1,722.360***	1,911.035***	2,006.060***	0.031*	0.033*
	(642.099)	(641.893)	(687.171)	(685.515)	(0.018)	(0.018)
R^2	0.026	0.027	0.022	0.028	0.012	0.027
Adjusted R^2	0.026	0.027	0.022	0.027	0.012	0.026
Residual Std. Error	17,965.670	17,956.450	19,226.750	19,176.730	0.497	0.493
F Statistic	121.691***	54.794***	105.245***	56.166***	54.906***	54.374***

Note: N = 13746. Non Robust Standard Errors applied. "White" is reference category for "non-White" categorical variable.

IMPORTANT: RUN BREUSCH PAGAN OFR EACH MODEL

1.6 Task 6: Subset analysis

NOTE: IN THIS CASE WE USE THE SUBSET ANALYSIS and not use interactions due to the efficeincy; if we were to use interactions, the analysis would have a higher statistical power, but the problem is: it would be really difficult to discern

NOTE WE STILL USE DIFF IN DIFF BECAUSE WE STILL WANT TO SEE THE EFFECT OF THE POLICY INTERVATION JUST HERE SUBSECTIONED BY DIFFERENT VARIABLES

GENERAL ASSUMTION: ALL WOMEN ARE SINGLE WOMEN IN THE DATA SET

WE ARE LOOKING AT THE POLICY EFFECT OF INTROUDCING THE TAX CREDIT WHEN CONSIDERING THE SUBSET OF WOMEN WITH CHILDREN and SUBsection HIGH vs low eduction

1.6.1 Women with Children compared based on high & low education levels

1.6.2 Women with and without Children compared keeping education level (low) constant

Table 6: Subsection Analysis Single Women with Children for alternating low/ high education levels

	Dependent variable:					
	earn		finc		work	
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	14,899.900***	12,958.640***	20,099.430***	16,218.430***	0.582***	0.532***
	(828.375)	(1,550.012)	(886.522)	(1,655.347)	(0.023)	(0.043)
has_children1	−8,596.327***	−8,394.973***	−8,929.330***	−8,269.567***	−0.159***	−0.150***
	(1,093.444)	(1,096.506)	(1,170.197)	(1,171.022)	(0.030)	(0.030)
dperiod	−695.997	−536.491	−940.239*	−515.553	−0.005	−0.024*
	(485.413)	(500.046)	(519.486)	(534.028)	(0.013)	(0.014)
age		22.555		78.717***		0.002***
		(15.922)		(17.004)		(0.0004)
urate		133.948		372.861***		−0.018***
		(114.614)		(122.403)		(0.003)
ed		66.337		−125.305**		0.017***
		(59.579)		(63.628)		(0.002)
nonwhite1		−1,255.622***		−2,438.387***		−0.043***
		(326.237)		(348.408)		(0.009)
has_children1:dperiod	1,682.810***	1,722.360***	1,911.035***	2,006.060***	0.031*	0.033*
	(642.099)	(641.893)	(687.171)	(685.515)	(0.018)	(0.018)
Observations	13,746	13,746	13,746	13,746	13,746	13,746
R^2	0.026	0.027	0.022	0.028	0.012	0.027
Adjusted R^2	0.026	0.027	0.022	0.027	0.012	0.026
Residual Std. Error	17,965.670	17,956.450	19,226.750	19,176.730	0.497	0.493
F Statistic	121.691***	54.794***	105.245***	56.166***	54.906***	54.374***

Note: N = 7819 Single Women have Children. N = 5593 high education (years of eduction >= 9 years); N = 2226 low education (years of eduction < 9 years); Non Robust Standard Errors applied. "White" is reference category for "non-White" categorical variable.

Table 7: Subsection Analysis Single Women with/ without Children for constant (low) education levels

	Dependent variable:					
	earn		finc		work	
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	11,066.700***	4,281.758	17,494.530***	8,507.214***	0.501***	0.441***
	(1,457.343)	(2,602.848)	(1,534.185)	(2,735.084)	(0.038)	(0.068)
has_children1	−2,323.038	−2,402.722	−3,739.399*	−3,267.950	−0.080	−0.087
	(2,026.514)	(2,030.169)	(2,133.367)	(2,133.311)	(0.053)	(0.053)
dperiod	783.677	1,378.102	322.393	1,127.629	−0.004	−0.007
	(858.662)	(882.127)	(903.937)	(926.943)	(0.023)	(0.023)
age		29.868		83.479***		0.001
		(29.856)		(31.373)		(0.001)
urate		651.163***		845.832***		−0.002
		(216.731)		(227.742)		(0.006)
nonwhite1		332.812		−2,403.220***		0.081***
		(664.392)		(698.146)		(0.017)
has_children1:dperiod	−413.449	−475.403	−179.637	−152.761	0.015	0.012
	(1,194.473)	(1,193.612)	(1,257.455)	(1,254.253)	(0.031)	(0.031)
Observations	4,311	4,311	4,311	4,311	4,311	4,311
R^2	0.006	0.009	0.010	0.016	0.003	0.008
Adjusted R^2	0.006	0.008	0.009	0.015	0.002	0.007
Residual Std. Error	18,962.540	18,944.100	19,962.390	19,906.540	0.498	0.497
F Statistic	9.304***	6.559***	14.690***	11.920***	4.494***	6.121***

Note: N = 4411 Single Women have Children (years of eduction < 9 years). N = 2085 has no children; N = 2226 has children; Non Robust Standard Errors applied. "White" is reference category for "non-White" categorical variable.

2 Tart 2 Instrumental Variable approach

Notes: - Effect of cumpulsory schooling on wages

Generaly: the quality and quantitiy of education in modern societies is on a steady rise; but it is difficult how much education contributes to future earnings on the labor market.. meansing: how much does one year of additional education add in earnings

This is because of unobserved factors that are to the detrimetn of assumtion 3 (mean independence) biasing any OLS estimate of wages on years of eduction (ommitted variables and confounders).

Here the solution: instruments to circumvent these biases; combining to characteristics: –¿ Minimum legal school dropout age (which can be 16, 17, or 18 years) –¿ and the annual quarter of birth of a person

Rational behind these choices: all students born in the sam year are admitted to school in the same cohort (the same class). BUT A student born in eg January reaches the leagal school dropout age earlier than a student born in September 8eg).

–¿ as such, the instruments function as if; we randomize school exposure to students, assuming that in each year, a constant fraction of students drops out of school adn this dorpout pattern is unrelated to when a students is born.

MAIN TASK: Estimate the effect of the yerars of education on the LOG scaled wages

2.1 Explain wHY ols is biased here - A3

We therefore use geographical proximity to a college when growing up as an exogenous instrument for education

INCLUDE EXOGENEOUS VARIABLES AS WELL IN THE INSTRUMENTAL PART!!!

SLIDE 67 ff IMPORTANT SEE SLIDES 7 ff!!!. –¿ IMPORTANT: ALSO INCLDUE 1) THE METHOD OF IV being different than least squares (it is a method look up in notes) and 2) mention the two requirements for a good Instrument: a) cleanliness no impact on outcome causally only through the biased independent varaible and b) the relevance which is high correlcion with the independent varaibvles that are instrumentalized

In this exercies give two examples of conditions that could bias the estimated education effect if only OLS is used; This means: give examples how the variable YEARSOFEDUCATION is a biased estimator becasue mean independece is violated –¿ the example given was: students preference for education may influence how long they stay in school and how much they earn on the labor market which is simply their ambition; other factors might be: family background and societal status/ socioeconomic status which means something like teen pregnancy OR IN THE 1930s during the great depression just the need to support the family during time of need so you could not go to school

eg IQ is a good thing

2.2 Summary statistics for this task

relevant quantiative variables age, educ (years of education), lnwage(weekly earnings), marrital status; quarter of birth of the recorded child; SMSA: categorical variable where someone lives (urban vs not urban); yob year of birth which is also categorical

–¿ possibly retransform lnwage to just wage by reversing the log scaling

Table 8: Instrumental Vairable Approach Descriptive Statistics of Numeric Indepdenent and Dependent Varaible

Statistic	Mean	St. Dev.	Min	Pctl(25)	Median	Pctl(75)	Max
Age	44.645	2.940	40	42	45	47	50
Years of Education	12.770	3.281	0	12	12	15	20
Ln(Wage)	5.900	0.679	−2.342	5.637	5.952	6.257	10.532

Notes: N = 13746; Wage is backwards transformed from lnWage

2.3 Diagnositcs of Year Of Birth as instrument: is it any good?

A good instrument possesses two specifications: it is clean and it is relevant

Cleanlieness: means that the Instrument only has an impact on the outcome through the Indepdendent variable (the to be "instrumentalized" variable); this assumption cannot be tested but is rather grounded in theory (meaning that the instrument is exogeneous – obviously you cannot test exogineity)

Relevantce: Contrarily, this assumption can be tested: it states that the instrument used for the "to be instrumentalize" variable is strong, meaning that there is a relevant correlation between the instrument and the independent variables. Note: a correlation between the instrument adn the independent variables beyond the baised variable is welcome. It only becomes a problem when the instrument and the dependent varaible are related; btu there will always be some correlation in that regard. To this end, an anova is run on the two stage model in order to conduct the F test, which helps with multiple outputs: Wu-Hausman, Sargan, and F test (the former two are only relevant if the model is overidentified by the instrument)

HOW DO I CONDUCT THESE TESTS? CAN I CONDUCT THEM ON THE NORMAL 2SLS via OLS or should I better use the IVreg model?

2.4 Conduct IVreg of the effect of effect of education on log wages, using quarter of birth as the instrument; are robust SE needed?