

Supplementary Table

Supplementary Table 1- Risk of Bias and Study Quality

a) Risk of bias of quasi-experimental studies

Study	Domain							Overall risk of bias	Quality
	Confounding	Selection bias	Misclassification	Deviation from intended intervention	Missing data	Measurement of outcomes	Selection of reported results		
Nguyen and Wang	Low	Low	Low	Low	Low	Low	Low	Low	high
Guindon	Moderate	Serious	Moderate	Moderate	Low	Serious	Moderate	Serious	low
Sood and Wagner	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	moderate
Mckinnon et al.	Moderate	Moderate	Moderate	Low	Moderate	Moderate	Moderate	Moderate	moderate
Huang and Gan	Low	Moderate	Serious	Low	Moderate	Moderate	Moderate	Serious	low
Bauhoff et al.	Moderate	Moderate	Moderate	Low	Low	Moderate	Moderate	Moderate	moderate
Sood et al.	Moderate	Low	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	moderate
Tanaka	Moderate	Moderate	Moderate	Moderate	Low	Moderate	Moderate	Low	high
Beuermann and Garzon	Moderate	Moderate	Moderate	Low	Low	Moderate	Moderate	Moderate	moderate
Aggarwal	Moderate	Moderate	Moderate	Moderate	Low	Moderate	Moderate	Moderate	moderate
Wang et al.	Moderate	serious	Low	Moderate	Moderate	Moderate	Moderate	Serious	low
Quimbo et al.	Low	Serious	Serious	Low	Low	Low	Low	Serious	low
Sosa-Rubi et al.	Moderate	Moderate	Low	Low	Moderate	Moderate	Low	Moderate	moderate
Rivera-Hernandez et al.	Moderate	Moderate	Low	Low	Moderate	Moderate	Low	Moderate	moderate
Nguyen and Sasso	Moderate	moderate	Low	low	low	Moderate	Low	Moderate	moderate
Lamichhane et al.	Low	Low	Low	Low	Low	Low	Low	Low	High

b) Risk of bias and quality of RCT study

Study	selection bias	reporting bias	Other bias	Performance bias	Detection bias	Attrition bias	○ > ●
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	Random sequence generation	Allocation concealment	Selective reporting		Blinding of participants and personnel	Blinding of outcome assessment	Incomplete outcome data	
Ansah et al. 2009	Low	Low	Low	Unclear	High	Low	Low	high

Supplementary Table 2- Effect of user charges on general health outcomes

Study	Country and policy scale	Quality of study	Population and settings	Data	Study design	Impact on health	Impact on secondary outcomes
Nguyen and Wang 2012	Vietnam (National level)	High	Removing user fees for non-poor Children Under six years old-  Before: User fees in the public	Two waves of the Vietnam Household Living Standard Surveys 2004 (n=2941) and 2006 (n=2504)	DID	Number of sick days: Significantly reduced 26% for children aged 4-5 years old (P<0.001)	Out-of-pocket expenditure: 1.7% reduction (p<0.01) for age group 4-5 years; Not statistically significant result for age group 0-3 years;

			hospitals were major financial burden After: Free Care including inpatient and outpatient services, and associated lab tests and generic medicines	Follow-up period: 12 months			Inpatient admission to secondary hospital: 0.02 (p<0.01) increase for age group 0-3 years; 0.03 (p<0.01) increase for age group 4-5 years  Inpatient admission to tertiary hospital: Not statistically significant result for age group 0-3; 0.035 (P<0.05) reduction for age group 4-5 years
Sood and Wagner 2015	India (State level: Karnataka	Moderate	Removing user charges for the people below poverty line-  Before: unspecified After: No premiums or copayments at the point of tertiary care at both private and public hospitals in 2010-2012	Random sample n= 6964 below poverty line households in villages eligible and ineligible for VAS  Follow-up period: 31 months	RD	Posthospitalization well-being: Not statistically significant result for self-care; Not statistically significant result for usual activities; Not statistically significant result for overall health; 0.7 (P<0.01) increase for walking ability; 0.66 (P<0.01) reduction in pain; 0.45 (P<0.1) reduction in anxiety  Occurrence of infectious during hospitalization: 9.4% reduction (95% CI: -20.2, 1.4)  Need for rehospitalization after the initial hospitalization: 16.5% reduction (95% CI: -28.7, -4.3)	Report any infection after hospitalization: 9.4 percentage points reduction (95% CI -20.2 to 1.4; P=0.087)
Beuermann et al. 2016	Jamaica (National level)	Moderate	Remove user fees for all adult Jamaicans-  Before: pay out-of-pocket fees (amount unspecified) After: no user fee for healthcare services (i.e. doctor's consultation, diagnosis, surgeries)	The Jamaica Labor Force Survey (LFS) and the Survey of Living Conditions (SLC), yearly waves from 2002 to 2012, sample size n= 35,434 individual-year observations  Follow-up period: 45 months	DID	Suffered illness four weeks prior to survey: Not statistically significant result  Likelihood of suffering illness: 28.6% reduction (P<0.05)  Number of sick days: 34% reduction (P<0.05)	Contribution to net real production to the Jamaican economy: yearly average of US\$PPP 26.6 million increase during the period 2008–12  Labor supply: 2.15 labor hours per week increase

Bauhoff et al., 2011	Georgia (National level)	Moderate	<p>Medical Insurance Program for the poor (MIP) in 2006 for the poor (cut-off score lower than 70000 (MIP 70) or 100000 (MIP 100) points in two regions)-</p> <p>Before: unspecified After: Few coverage limits and no co-payments for most emergency outpatient care and both planned and emergency inpatient care for the MIP beneficiaries; Basic universal package subjected to co-payments of 25%-50% for non-MIP population</p>	<p>A total sample n= 3600 households, with households n= 900 for each of the two geographically varying thresholds with above and below thresholds</p> <p>Follow-up period: 24 months</p>	RD	<p>Self-reported activities of daily living: Not statistically significant result between undisable with age of 40+ beneficiaries and non-beneficiaries; Not statistically significant result between disabled with age of 40+ beneficiaries and non-beneficiaries; Not statistically significant difference between beneficiaries and non-beneficiaries aged 12-39;</p> <p>General health: Not statistically significant difference between beneficiaries and non-beneficiaries;</p>	<p>Out-of-pocket expenditure: 0.526 reduction for inpatient (P&lt;0.05) (MIP70); 0.424 reduction for inpatient (P&lt;0.01) (MIP100); 1.45 reduction for outpatient (MIP70); 0.454 reduction for outpatient (P&lt;0.01) (MIP100);</p> <p>Outpatient or inpatient service utilization: Not statistically significant for inpatient and outpatient;</p> <p>Drugs and treatment for chronic diseases: Not statistically significant standard difference for high blood pressure; Not statistically significant standard difference for arthritis;</p>
Guidon, 2014	Vietnam (National level)	Low	<p>Health Care Fund for the Poor (HCFP) 2003 to remove user charges for officially classified poor and ethnic minority-</p> <p>Before: unspecified After: No deductibles for from most outpatient and inpatient care at government facilities and drugs on the Ministry of Health list, financed from general government revenues at both national (75%) and provincial (25%) levels</p>	<p>Vietnam Household Living Standards Survey (VHLSS) 2004 and 2006 with sample n=6575 individuals from 1790 households</p> <p>Follow-up period: 36 months</p>	DID	<p>Number of sickness days: Not statistically significant result;</p> <p>Number of bed days estimate: Not statistically significant result;</p>	<p>Number of inpatient admissions (2004 vs 2006): More than 55% increase (SE=0.02);</p> <p>Utilization of outpatient services: Not statistically significant result;</p>
Aggarwal 2010	India (District level: Karnataka State)	Moderate	<p>Community-based Health Insurance Program (CBHI) to remove user charges for disadvantaged rural farmers and informal sector workers-</p> <p>Before: full cost for</p>	<p>Household survey in 82 villages across 16 districts in rural Karnataka between 2007 and 2008 n=4109</p>	PSM	<p>Satisfaction level (scale 1-3): 0.054 increase (P&lt;0.10);</p> <p>Days lost per sick time: Not statistically significant result;</p> <p>Whether work regularly (1= yes):</p>	<p>The number of consultations and visits to medical facility: 6%-7% higher for the insured than the uninsured. (P&lt;0.1);</p> <p>Use of inpatient treatment in private hospital services:</p>

			treatment After: free outpatient diagnosis for all types of medical events and up to 50% discount on all laboratory tests	Follow-up period: 47 months		0.076 increase (P<0.1);  Whether post-surgery life improved (1=yes): 3.80 increase (P<0.10);  Whether caesarean (1= yes): Not statistically significant result;	17% increase for the better-off segment of population; Not visible for the lower socio-economic group;  Use of government hospitals: 19% reduction for outpatient (P<0.1); 25% reduction for surgery (P<0.1);  Borrowings for catastrophic expenditure for surgical treatment: 36% reduction for the better-off group; 30% reduction for the worse-off group;  Overall health expenditure: 19%-20% higher for the insured than the uninsured;
Wang et al. 2016	China (Rural area)	Low	Reduce out-of-pocket payment for rural residents aged older than 12 years-  Before: unspecified After: reduced 26%-35%	China Health and Nutrition Survey (CHNS) waves 2000, 2004, 2006, and 2009 total sample size n= 46,116 individuals or 13,025 households  Follow-up period: 72 months	DID-PSM	Report sickness in past month (with the model eliminating county-level selection bias): Not statistically significant difference between treatment and control group for household- and individual- level matching, and among low-income and high- income group compared to their respective counterparts;  Self-reported health status is fair or poor (with the model eliminating county-level selection bias): Not statistically significant difference between treatment and control group for household- and individual- level matching, and among low-income and high- income group compared to their respective counterparts;  Measured hypertension (with the model eliminating county-level selection bias): Not statistically significant difference between treatment and control group for household- and individual- level matching, and among low-income and high- income group compared to their respective counterparts;	Total treatment cost: Ln (-0.153) (P<0.01)- Ln (-0.184) (P<0.005);  Doctor visit in last 4 weeks: -0.024 (P<0.1) ~ -0.032 (P<0.05) reduction (individual level matching);  Preventive service utilization: 0.022 (P<0.001)- 0.018(P<0.05) increase (individual level matching);  Visits to folk doctors: 0.02 reduction (P<0.1) (individual level matching);
Nguyen and Sasso 2017	Vietnam (National level)		Remove user charges for children under six years old-	Vietnam Household Living Standards Survey (VHLSS)	DID	Number of days staying in bed: Not statistically effect size for children aged 0-2 years;	Outpatient visit: 27% increase for aged 0-2; 20% increase for aged 3-5;

			Before: unspecified After: free care at public facilities for inpatient and outpatient services (excluding non-prescription medicines)	waves 2002 n=132384 individuals, 2004-2006- 2008 n=40000 individuals  Follow-up period: 36 months		Not statistically effect for children aged 3-5 years;  Number of days having limited activities: Not statistically effect size for children aged 0-2 years; 12% reduction (P<0.01) in for children aged 3-5 years;	Hospital admission: 56% increase for aged 0-2; 22% increase for aged 3-5;  Out-of-pocket spending: 50% reduction for inpatient for aged 3-5 years (P<0.01); Not statistically significant effect size for inpatient for aged 0-2 years; Not statistically significant effect size for outpatient for aged 0-5 years;
Huang and Gan 2015	China (urban area of the country)	Low	Increased user charges for urban employees-  Before: Outpatient care: Around 30%~40% of total health expenditure were paid out-of-pocket. Inpatient care: Around 20% of total health expenditure were paid out-of-pocket After: Outpatient care: Around 86% of total expenditure were paid out-of-pocket Inpatient care: Around 28% of total health expenditure were paid out-of-pocket.	1991-2006 waves of China Health and Nutrition Survey (CHNS) n=7065  Follow-up period: 98 months	DID	Self-reported poor health status: not statistically significant results;	Outpatient utilization: 7% reduction (SE=2.3), P<0.05;  Outpatient expenditure: 35.2% reduction (SE=10.8), P<0.05;  Inpatient utilization: 0.1% reduction (SE=1.0), P>0.05;  Inpatient expenditure: 4.1% increase (SE=7.8), P>0.05;

DID= difference-in-difference; RD= regression discontinuity; PSM= propensity score matching; DID-PSM= difference-in-difference- propensity score matching

Supplementary Table 3- Effect of user charges on mortality outcomes

Study	Country and policy scale	Quality of study	Population and settings	Data	Study design	Impact on health	Impact on secondary outcomes
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Sood et al. 2014	India (State level: Karnataka)	Moderate	Remove user charges for households below poverty line-  Before: unspecified After: free tertiary care at the point of service in both private and public hospitals	31476 households in 300 scheme eligible villages and 28633 households in 272 scheme ineligible villages  Follow-up period: 31 months	RD	Mortality: 64% reduction (95% CI: 0.4, 0.75) among eligible households below poverty line compared to the ineligible;  Not statistically significant difference between households above poverty line in eligible and ineligible area;	Out-of-pocket expenditures: 34% reduction (95% CI: 0.18, 0.51) for admissions to hospitals with tertiary care facilities likely to be covered by the scheme;  Tertiary care utilization: 12.3% increase (95% CI: -0.2, 0.45);
Ansah et al. 2009	Ghana (District level: Dangme West District)	High	Remove user charges for rural children under five years old-  Before: unspecified After: free primary care, drugs and initial secondary care on moderate anaemia (treatment arm) paid 17,000 Ghana cedis ( $\approx$ US\$3865) for a case of malaria (control arm)	Stratified randomization n= 2500 children from 2332 households  Follow-up period: 24 weeks	RCT	Prevalence of moderate anaemia: Not statistically significant different between intervention and control arm;  Mean Hb concentration: Not statistically significant change between intervention and control children;  Prevalence of parasitaemia: Not statistically significant different between intervention and control arm;  Death: Not statistically significant difference between intervention group and control group;	Utilization of primary care clinic: RR=1.12 (95% CI, 1.04-1.2, P=0.001);  Utilization of hospital: Not statistically significant result;  Utilization of chemical seller: RR=0.9 (95% CI, 0.85-0.97, P<0.001);  Utilization of home treatment: RR=0.89 (95% CI, 0.82-0.96, P<0.001);  Utilization of traditional healer: Not statistically significant result;  Utilization of normal healthcare service: RR=0.9 (95% CI, 0.86-0.95, P<0.001);
McKinnon et al., 2015	Ghana, Kenya and Senegal (policy countries); Cameroon, Congo, Ethiopia, Gabon, Mozambique, Nigeria and Tanzania (control countries)	Moderate	Remove user fees for women-  Before: unspecified After: Free deliveries in public, private and facility-based health facilities, covering all normal deliveries, management of assisted deliveries including caesareans, and management of medical and surgical complications of delivery (Ghana 2003) Free deliveries in all public dispensaries and health centres, including all supplies required for delivery. The policy did not	Demographic and Health Surveys (DHS) 1997-2012  Follow-up period: 108 weeks	DID	Neonatal death: 9% reduction (95% CI: -6.8, 1);	Facility-based delivery: 5% increase (95% CI: 0.9, 5.2);  Cesarean deliveries: Not statistically significant result;

			initially cover delivery fees in district hospitals and thus did not apply to Caesarean sections (Kenya 2007) Covers normal deliveries at health posts and health centres and Caesarean sections at district and regional hospitals (Senegal (2005)				
Lamichhane et al. 2017	Nepal (National level)	High	Remove user charges for women (15-49 years old)- Before: unspecified After: free delivery at public facilities	Nepal Demographic and Health Surveys (NDHS) 2001-2008 Live-births n=5783 (2006); n=5306 (2011)  Follow-up period: 77 months	DID	Neonatal mortality compared to control group: 4.5 (95%CI: -0.07, -0.02) percentage points reduction for all women 6.9 (95%CI: -0.104, -0.035) percentage points reduction for women from lower castes and indigenous groups;	Probability of delivery by skilled birth assistance: 5.6 (95% CI: 0.002, 0.11) percentage point increase; 8.2 (95% CI: -0.01, 0.17) groups percentage point increase for the lower castes and indigenous;  Delivery in public facility: 5.1 (95% CI: -0.003, 0.11) percentage point increase; 6.3 (95% CI: -0.01, 0.14) percentage point increase for the lower castes and indigenous groups;

RD= regression discontinuity; RCT= randomized control trial

Supplementary Table 4- Effect of user charges on infectious disease-related outcomes

Study	Country and policy scale	Quality of study	Population and settings	Data	Study design	Impact on health	Impact on secondary outcomes
Sood and Wagner 2015	India (State level: Karnataka)	Moderate	Removing user charges for the poor-  Before: unspecified After: No premiums or copayments at the point of tertiary care at both private and public hospitals in 2010-2012	Random sample n= 6964 below poverty line households in villages eligible and ineligible for VAS	RD	Posthospitalization well-being: Not statistically significant result for self-care; Not statistically significant result for usual activities; Not statistically significant result for overall health; 0.7 (P<0.01) increase for walking ability; 0.66 (P<0.01) reduction in pain; 0.45 (P<0.1) reduction in anxiety;  Occurrence of infectious during hospitalization: 9.4% reduction (95% CI: -20.2, 1.4);  Need for rehospitalization: 16.5% reduction (95% CI: -28.7, -4.3);	Need for rehospitalization after the initial hospitalization: 16.5 percentage points reduction (95% CI -28.7 to -4.3; p<0.01);



						Report any infection after hospitalization: 9.4 percentage points reduction (95% CI –20.2 to 1.4; p=0.087);	
Ansah et al. 2009	Ghana (District level: Dangme West District)	High	Remove user charges for rural children under five years old-  Before: unspecified After: free primary care, drugs and initial secondary care on moderate anaemia (treatment arm) paid 17,000 Ghana cedis ( $\approx$ US\$3865) for a case of malaria (control arm)	Stratified randomization n= 2500 children from 2332 households	RCT	Prevalence of moderate anaemia: Not statistically significant different between intervention and control arm;  Mean Hb concentration: Not statistically significant change between intervention and control arm;  Prevalence of parasitaemia: Not statistically significant different between intervention and control arm;  Death: Not statistically significant difference between intervention group and control group;	Utilization of primary care clinic: RR=1.12 (95% CI, 1.04-1.2, P=0.001);  Utilization of hospital: Not statistically significant result;  Utilization of chemical seller: RR=0.9 (95% CI, 0.85-0.97, P<0.001);  Utilization of home treatment RR=0.89 (95% CI, 0.82-0.96, P<0.001);  Utilization of traditional healer: Not statistically significant result;  Utilization of normal healthcare service: RR=0.9 (95% CI, 0.86-0.95, P<0.001);
Quimbo et al. 2011	Philippines (central regions)	Low	Remove user charges for poor children-  Before: 49% of total health expenditure paid out-of-pocket After: Increase peso ceilings to eliminate copayment for hospitalization	Two rounds of data with 1100 patients each in the intervention and control sites  Follow-up period: 24 months	DID	Wasting (<0.9 actual weight to ideal weight of actual height): 9-12% reduction (P<0.1);  Presence of an acute infection or other types of inflammation (CRP-positive)*: 4-9% reduction(P<0.1);	NIL

\*CRP indicates the presence of an acute infection or other types of inflammation

DID= difference-in-difference; RD= regression discontinuity; RCT= randomized control trial

Any form of infection comes under the infectious disease outcome domain in this paper.

Supplementary Table 5- Effect of user charges on non-communicable disease-related outcomes

Study	Country and policy scale	Quality of study	Population and settings	Data	Study design	Impact on health	Impact on secondary outcomes
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Rivera-Henandez et al. 2016	Mexico (National level)	Moderate	Remove user charges for the poor older adults aged 50 and above-  Before: unspecified After: remove copayment for specific type of health	National Health and Nutrition Survey (ENSA NUT) year 2000 n= 45,294 older adults, year 2005–2006 n= 45,241, and year 2011–2012 n= 46,277  Follow-up period: 144 months	IV	Use of insulin/oral agents: Marginally significant positive effect of 0.41 (P<0.051);  Blood pressure monitoring: Not statistically significant result for diabetic patients;  Antihypertensive medication: Not statistically significant result for hypertensive patients;  Follow nutritional diet: Not statistically significant result for diabetic patients and hypertensive patients;  Adherence to exercise program: Not statistically significant result for diabetic patients and hypertensive patients;  The use of Alternative medicine: Not statistically significant result for diabetic patients and hypertensive patients;	Use of insulin and oral agents for age older than 50 years old: 40% increase (P=0.051);
Sosa-Rubi et al. 2009	Mexico (National level)	Moderate	Remove co-payment for poor adults (aged 20-80 years)- Before: unspecified After: no co-payment for specific type of healthcare received	National Health and Nutrition Survey (ENSANUT) year 2006 adults with diabetes n=1491 (excluding those access to social security service, missing values and women with gestational diabetes)  Follow-up period: 60 months	PSM	Glucose control (HbA1c): 5.6 percentage points increase (P<0.01) in those with appropriate control; 17.5 percentage points decrease (P<0.01) in those with very poor control;	Regular use of any blood glucose control test: 0.095 increase (P<0.01);  Number of insulin shots per week among insulin users: 3.13 increase (P<0.05);  Number of blood sugar control tests per month: 0.14 increase (P<0.01);  Four or more physician visits per year: 0.09 increase (P<0.01);
Ansah et al. 2009	Ghana (District level: Dangme West District)	High	Remove user charges for rural children under five years old-  Before: unspecified After:	Stratified randomization n= 2500 children from 2332 households	RCT	Prevalence of moderate anaemia: Not statistically significant different between intervention and control arm;  Mean Hb concentration: Not statistically significant change between intervention and control arm;	Utilization of primary care clinic: RR=1.12 (95% CI, 1.04-1.2, P=0.001);  Utilization of hospital:

			free primary care, drugs and initial secondary care on moderate anaemia (treatment arm) paid 17,000 Ghana cedis (≈ US\$3865) for a case of malaria (control arm)			<p>Prevalence of parasitaemia: Not statistically significant different between intervention and control arm;</p> <p>Death: Not statistically significant difference between intervention group and control group;</p>	<p>Not statistically significant result;</p> <p>Utilization of chemical seller: RR=0.9 (95% CI, 0.85-0.97, P&lt;0.001);</p> <p>Utilization of home treatment RR=0.89 (95% CI, 0.82-0.96, P&lt;0.001);</p> <p>Utilization of traditional healer: Not statistically significant result;</p> <p>Utilization of normal healthcare service: RR=0.9 (95% CI, 0.86-0.95, P&lt;0.001);</p>
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Supplementary Table 6- Effect of user charges on nutritional and anthropometric outcomes

Study	Country and policy scale	Quality of study	Population and settings	Data	Study design	Impact on health	Impact on secondary outcomes
Tanaka, 2014	South Africa (National level)	High	<p>Remove user fees for poor women and children under six years old-</p> <p>Before: unspecified After: Free services to pregnant women included prenatal and postnatal care from confirmation of pregnancy until 42 days after delivery, and all health services to children under six years old became free.</p>	<p>KwaZulu-Natal Income Dynamic Study (KIDS) 1993 wave=1389 households; 1998 wave=1178 households</p> <p>Follow-up period: 60 months</p>	DID	<p>Short term average weight-for-age z-scores (WAZ) of newborns: 0.64 standard deviations increase for all (P&lt;0.05); 0.969 increase for boys (P&lt;0.05); Not statistically significant result for girls;</p> <p>Short term average weight-for-age z-scores (WAZ) of already born children: 0.57 standard deviations increase for all (P&lt;0.1); 1.049 increase for boys (P&lt;0.05); Not statistically significant result for girls;</p> <p>Weight-for-height z-score difference at baseline between high and low treatment: Not statistically significant result;</p>	NIL

Quimbo et al. 2011	Philippines (central regions)	Low	<p>Remove user charges for poor children-</p> <p>Before: 49% of total health expenditure paid out-of-pocket After: Increase peso ceilings to eliminate copayment for hospitalization</p>	<p>Two rounds of data with 1100 patients each in the intervention and control sites</p> <p>Follow-up period: 24 months</p>	DID	<p>Wasting (&lt;0.9 actual weight to ideal weight of actual height): 9-12% reduction (P&lt;0.1);</p> <p>Presence of an acute infection or other types of inflammation (CRP-positive)*: 4-9% reduction(P&lt;0.1);</p>	NIL
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DID= difference-in-difference

