Gendered Transport Subsidy and its Short Run Effect on Female Employment

Aparajita Dasgupta[1]   Ashokankur Datta [2]

[1]Ashoka University

[2]Shiv Nadar University

Introduction

Motivation

- Female mobility related frictions $\rightarrow$ widely recognized as barrier to development (Klugman et al. 2014; Jayachandran 2015)
- In South Asian cities, female labour force participation(FLFP) is low even at relatively high levels of education (Field et al. 2016; Fletcher et al. 2018)
- Urban India characterized by a low & declining FLFP
  - Urban FLFP rate fell from 22% to 11% in 2016-2019 (Deshpande and Singh, 2021)
- 30% of women *outside* the labour force find absence of cheap, accessible & safe transport as a barrier to LFP (Alam et al., 2021)
  - While understanding such access barriers is important there is limited causal evidence (World Bank, 2022)
- We leverage the variation from a gendered transport subsidy in urban India to understand its role in easing supply-side bottlenecks for female mobility & work participation

Access barriers & Gendered Outcomes

- Gender blind design of urban public transport fails to accommodate differential constraints faced by men & women

- Gender differences in transport & travel patterns driven by differential access to economic, social & time resources (Turner & Grieco, 2000)
  - Women spend about 8 minutes per day on traveling for employment while men spend 40 minutes (TUS 2020)

- Women's travel patterns often characterised by short trip length, dependency on public transport, restricted travel time & multiple-purpose trips (trip chaining) (Mahendru, 2022)

- Disproportionate costs of mobility constraints on lower income households
  - Women lower-income households use slower modes of transport & look for work at shorter distances from home(Anand & Tiwari, 2006)

Access barriers & Gendered Outcomes

- Distance barriers are larger for women on **Education & skills training**

  - Providing cycles to girls in Bihar $\rightarrow$ increased secondary schooling (Muralidharan & Prakash, 2017)

  - Cheema et al.(2022) provides experimental evidence from Lahore
    - women who have to travel a few km outside their village for training are four times less likely to complete it

  - Field & Vyborny (2022) experimental evidence from Pakistan find reducing physical mobility constraints
    - large impact on job searching for women, including women who are not searching at baseline

Contribution

- We contribute to the growing literature which explores the underlying factors limiting FLFP
    - **Social norms** (Fernández 2013; Field et al. 2021; Bertrand et. al 2015; Bernhardt et al. 2018; Bursztyn et al. 2020; Jayachandran 2021)
    - **Safety** (Velásquez 2019, Siddique 2018, Chowdhury 2019)
    - **Spatial frictions** driving gender disparities in access to education (Muralidharan et al. 2017, Cheema et al. 2020, Borker 2021)
- Limited research on investigating barriers on **physical mobility** as a mechanism for understanding labour supply response (Field et al 2022)
- One of the first studies to exploit a natural experiment to study the impact of gendered transport subsidy on employment outcomes
- Rich data on time-use $\longrightarrow$ to examine gender-specific travel frictions
    - Allows us to study:
        - both intensive & extensive margin
        - study mechanisms & spill over effects

Background

Pink Pass Scheme

- **Timeline**: Launched by Government of Delhi in 2019 - Implemented on October 29, 2019
- **Policy**: Free bus rides for women travelling on intra-city buses
- **Take-up**: Approximately 1000 million pink tickets were issued in the period between October 2019 and January 2023 (Raj, 2023)
  - Ridership of women increased by 11% from Nov 2019 (Mahendru, 2022)
- **Objective**:
  - Provide safe transport to women
  - Reduce pecuniary & non-pecuniary cost of transport
  - Ease mobility constraints for women & encourage LFP

Our Setting

- Delhi is one of the wealthiest regions in India
- Around 21% & 39% of households in urban Delhi have personalised 4 wheeler & 2 wheeler (Govt of Delhi, 2020)
- Availability of public transport such as the Delhi Metro is costlier
- $\approx$ 75% of frequent bus users have a household monthly income of less than Rs. 30,000 (Suman et al., 2016)
- In this set-up, the Pink Pass policy is likely to impact women from economically marginalised household

Data

Data

Time Use Survey-2019

- Nationally representative time-use survey
  - Administered by the Ministry of Statistics and Programme Implementation (MoSPI) in 2019
  - Detailed time use, demographic & economic characteristics
    - Collect time-use information from 4:00 AM on the day before the interview date to 4:00 AM on the interview day
- For our study, we limit sample to urban areas within the state of Delhi & its neighboring districts in Uttar Pradesh & Haryana
  - In addition to 9 districts of the state of Delhi, the districts being considered are Gautam Budh Nagar, Ghaziabad, Faridabad, Gurgaon, Jhajjar and Sonipat
- We have variation across households that were surveyed *before* & *after* the treatment

Data

Key outcome measures

- Extensive & intensive margins for **paid work** (indicator & amount of time spent)
  - Paid work in TUS-2019: time spent on activities related to self-employment, wage & salary work; casual labour for production of goods & services
- Extensive & intensive margins for **employment**
  - time spent on employment in govt., corporations, non-profit inst, household enterprises for production of goods & services, empl related ancillary activities, training & studies related to emp, seeking emp, setting up business, emp related travel etc.
- We use a host of individual & household level controls like age, years of schooling, schooling of household head, religion, caste, access to clean cooking fuel & *pucca* house

Summary Statistics

Table 1: Summary of the Sample Data

	Individual Level Variables			
	Delhi		Neighbour Districts	
	Men	Women	Men	Women
	(N=2,633)	(N=2,274)	(N=1,514)	(N=1,264)
Paid Work				
Indicator	0.71 (0.45)	0.14 (0.35)	0.73 (0.44)	0.15 (0.35)
Minutes	383.46 (272.44)	58.51 (160.96)	371.45 (245.38)	59.93 (155.19)
Employment				
Indicator	0.76 (0.43)	0.16 (0.36)	0.74 (0.44)	0.16 (0.37)
Minutes	419.56 (279.35)	66.34 (176.39)	402.88 (261.57)	68.12 (171.35)
Outside Home				
Employment Minutes	388.86 (287.41)	61.84 (171.29)	390.48 (267.97)	63.96 (167.61)
Travel Minutes	61.04 (78.32)	20.71 (64.80)	68.52 (56.91)	20.32 (46.65)
Age (Years)	34.86 (12.29)	35.96 (12.52)	34.26 (11.99)	35.47 (12.46)
Schooling (Years)	10.94 (4.36)	9.82 (5.39)	11.00 (4.87)	9.86 (5.80)

Empirical Strategy

Empirical Strategy

We employ differences in differences (DID) strategies

- First DID: compare pre-post between women & men within Delhi
- Second DID: compare pre-post differences between women in Delhi & neighboring areas
- DDD: triple difference estimate compare pre-post differences between women & men in Delhi & neighboring areas

In all of them,

- Women in Delhi constitute the treatment group
- Period after October 2019 is the post-treatment period

Empirical Strategy

First DID strategy: This relies on comparing pre-post differences between men & women in Delhi for the Pink Pass scheme

$$
\begin{aligned}
Y_{ihdt} = {} & \beta_0 + \beta_1 Post_t + \beta_2 Female_{ihd} + \\
& \beta_3(Post_t \times Female_{ihd}) + X_{ihd}\alpha + Z_{hd}\gamma + \\
& \kappa_h + M_t + \delta_d + \varepsilon_{ihdt}
\end{aligned} \tag{1}
$$

- Coefficient of Interest: β_3
- X and Z are vectors of individual and household controls.
- κ and δ denote household and district fixed effects.
- M denotes month of survey fixed effects.

Empirical Strategy

Second DID strategy: This relies on comparing differences in trends in LFP between women in Delhi versus those in surrounding areas after the Pink Pass Scheme is launched.

$$Y_{ihdt} = \beta_0 + \beta_1 Post_t + \beta_3(Post_t \times Delhi_d) \qquad (2)$$
$$+ X_{ihd}\alpha + Z_{hd}\gamma + M_t + \delta_d + \varepsilon_{ihdt}$$

- $Delhi$ is an indicator variable that takes value 1 for women in Delhi
- Control group includes women from neighboring districts(Only Urban Areas): Faridabad, Gurgaon, Jhajjhar, Sonipat, Ghaziabad and Gautam Budh Nagar
- Coefficient of Interest: β_3

Empirical Strategy

Triple Difference: Combining the above two DID frameworks

$$
\begin{aligned}
Y_{ihdt} = \ & \beta_0 + \beta_2 Female_{ihd} + \\
& \beta_3 (Post_t \times Female_{ihd} \times Delhi_d) \\
& + \beta_4 (Female_{ihd} \times Delhi_d) \\
& + \beta_5 (Female_{ihd} \times Post_t) \\
& + X_{ihd}\alpha + \kappa_h + \varepsilon_{ihdt}
\end{aligned}
\tag{3}
$$

- Coefficient of Interest: β_3
- X is the vectors of individual controls
- κ denotes household fixed effects

Results

Results

Table 2: DID 1 Estimates (Control Group: Working Age Urban Males in Delhi)

	Paid Work		Employment		Outside Home	
	(1)	(2)	(3)	(4)	(5)	(6)
	Indicator	Mins	Indicator	Mins	Employment	Travel
Post	-0.07	-47.08	-0.00	-44.19	-13.22	5.22
	(0.05)	(28.68)	(0.03)	(28.07)	(29.75)	(6.19)
Female	-0.58***	-331.12***	-0.59***	-358.85***	-328.48***	-37.60***
	(0.02)	(11.29)	(0.02)	(10.88)	(11.45)	(2.96)
Post × Female	0.08	56.12*	0.02	58.95*	35.79	-6.97
	(0.06)	(33.47)	(0.05)	(32.39)	(32.45)	(6.01)
Observations	4816	4816	4816	4816	4816	4816

NOTES: Standard errors, clustered at the urban ward level reported in parenthesis.* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. These are DID estimates with urban Delhi women as the treatment group and urban Delhi men as the control group. Dependent variables are either indicators or in minutes. We use controls in each column as follows: schooling (in years), age (in years), household size, schooling of household head (in years), *pucca* house (Indicator), access to clean cooking fuels (Indicator), official caste categories, religion, the month of survey and district fixed effects.

Results

Table 3: DID 1: Effects by Low and High MPCE categories

	Paid Work		Employment		Outside Home	
	(1)	(2)	(3)	(4)	(5)	(6)
Low MPCE	Indicator	Mins	Indicator	Mins	Employment	Travel
Post × Female	0.07	73.42*	0.01	74.95**	59.09	-2.42
	(0.08)	(39.09)	(0.07)	(36.66)	(37.59)	(8.85)
Observations	737	737	737	737	737	737
High MPCE	Indicator	Mins	Indicator	Mins	Employment	Travel
Post × Female	0.09	57.47	0.03	60.84*	36.12	-7.34
	(0.07)	(37.00)	(0.06)	(36.55)	(36.53)	(6.61)
Observations	4079	4079	4079	4079	4079	4079

NOTES: Standard Errors, clustered at urban ward level reported in parenthesis. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. : For both sub-population of households, men from the same households act as controls. MPCE less than 2500, is considered as *Low MPCE* and otherwise considerd as *High MPCE*. Dependent variables are measured either in minutes or indicators. We use controls in each column as follows: schooling (in years), age (in years), household size, schooling of household head (in years), *pucca* house (Indicator), access to clean cooking fuels (Indicator), official caste categories, religion, the month of survey and district fixed effects.

Results

Table 4: DID 1 Estimates: (Control Group: Working Age Urban Males in Delhi)

	Paid Work		Employment		Outside Home	
	(1)	(2)	(3)	(4)	(5)	(6)
	Indicator	Mins	Indicator	Mins	Employment	Travel
Female	-0.60***	-341.20***	-0.61***	-369.25***	-341.33***	-40.35***
	(0.02)	(11.35)	(0.02)	(10.95)	(11.72)	(2.76)
Post × Female	0.08	55.20*	0.01	57.68*	35.38	-8.90
	(0.06)	(32.17)	(0.04)	(30.83)	(31.11)	(6.49)
Observations	4558	4558	4558	4558	4558	4558

NOTES: Standard errors, clustered at urban ward level reported in parenthesis.* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. These are DID estimates with urban Delhi women as the treatment group and urban Delhi men as the control group. Dependent variables are either indicators or in minutes. We use controls in each column as follows: schooling (in years), age (in years) and household fixed effects.

Results

Table 5: DID I with household fixed effects: Low and High MPCE categories

	Paid Work		Employment		Outside Home	
	(1)	(2)	(3)	(4)	(5)	(6)
Low MPCE	Indicator	Mins	Indicator	Mins	Employment	Travel
Post × Female	0.12	101.32***	0.06	102.11***	84.43**	-2.87
N=727	(0.07)	(38.16)	(0.05)	(35.11)	(36.68)	(8.32)
High MPCE	Indicator	Mins	Indicator	Mins	Employment	Travel
Post × Female	0.08	47.86	0.00	50.46	27.53	-10.58
N=3831	(0.07)	(37.02)	(0.05)	(36.50)	(36.32)	(7.73)

NOTES: Standard Errors, clustered at the urban ward level reported in parenthesis. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.
MPCE less than 2500, is considered as *Low MPCE* and otherwise *High MPCE*. For both sub-population of households, men from the same
households act as controls. Dependent variables are either indicators or in minutes. We use controls in each column as follows: schooling (in
years), age (in years) and household fixed effects. .

Results:Checking pre-trends

Table 6: Pre-Trends: Coefficient for (*Female* × *t*) with <u>Household Fixed Effects</u>

	Paid Work		Employment		Outside Home	
	(1)	(2)	(3)	(4)	(5)	(6)
	Indicator	Mins	Indicator	Mins	Employment	Travel
Female × Week Number	-0.00	-1.30	-0.00	-0.48	-0.75	0.44**
	(0.00)	(0.98)	(0.00)	(0.92)	(0.93)	(0.21)
Observations	3844	3844	3844	3844	3844	3844
Female × Month Number	-0.00	-5.62	-0.01	-2.22	-3.37	1.77**
	(0.01)	(4.18)	(0.01)	(3.96)	(4.02)	(0.84)
Observations	3890	3890	3890	3890	3890	3890

(Week till 43 and Month till October)

NOTES: Standard Errors, clustered at urban ward level reported in parenthesis. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.These are estimates of the coefficient of the interaction between the indicator variable *Female* and the continuous time variable t. Week number till 43 and months till October (10th month) of 2019 is treated as *Week Number* and *Month Number* in pre-trend period. Urban Delhi women are the treatment group, and urban Delhi men as the control group.Dependent variables are measured in minutes and indicators . We use controls in each column as follows: schooling (in years), age (in years) and household fixed effects.

Results:Checking pre-trends for Low and High MPCE

Table 7: Conditional Pre-Trends for DID-1: Low and High MPCE

	Control Group: Male Individuals in Urban Delhi					
	Paid Work		Employment		Outside Home	
Low MPCE	(1) Indicator	(2) Mins	(3) Indicator	(4) Mins	(5) Employment	(6) Travel
Female × Week Number	0.00	0.43	0.00	0.78	0.76	0.24
N=595	(0.00)	(1.68)	(0.00)	(1.68)	(1.70)	(0.46)
Female × Month Number	0.01	3.18	0.01	4.45	4.58	1.09
N=604	(0.01)	(7.38)	(0.01)	(7.47)	(7.44)	(1.96)
High MPCE	Indicator	Mins	Indicator	Mins	Employment	Travel
Female × Week Number	-0.00	-1.46	-0.00	-0.55	-0.87	0.48**
N=3249	(0.00)	(0.98)	(0.00)	(0.92)	(0.94)	(0.21)
Female × Month Number	-0.00	-6.58	-0.01	-2.80	-4.17	1.90**
N=3286	(0.01)	(4.11)	(0.01)	(3.91)	(3.98)	(0.83)

NOTES: Standard Errors, clustered at urban ward level reported in parenthesis.* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. These are estimates of the coefficient of the interaction between the indicator variable *Female* and the continuous time variable t.MPCE less than 2500, is considered as Low MPCE and otherwise High MPCE.Week number till 43 and months till October (10th month) of 2019 is treated as Week Number and Month Number in pre-trend period.Dependent variables are measured in minutes and indicators. We use controls in each column as follows: schooling (in years), age (in years) and household fixed effects.

Event Study

Full Sample Event study with <u>Household Fixed Effects</u>: Control Group is Men within Delhi
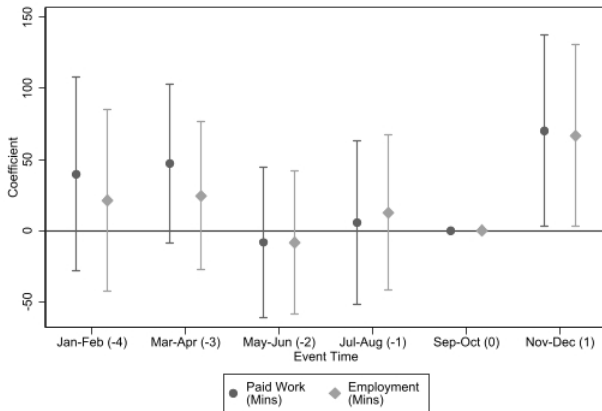
Note: Point estimates and 90 % confidence intervals reported.

Treatment: Women of Working Age from Delhi
Control: Men of Working Age from Delhi

Event Study

Event study with Household Fixed Effects: Low MPCE (Below Median) Sample

Note: Point estimates and 90 % confidence intervals reported.

Treatment: Women of Working Age from Delhi
Control: Men of Working Age from Delhi

Event Study

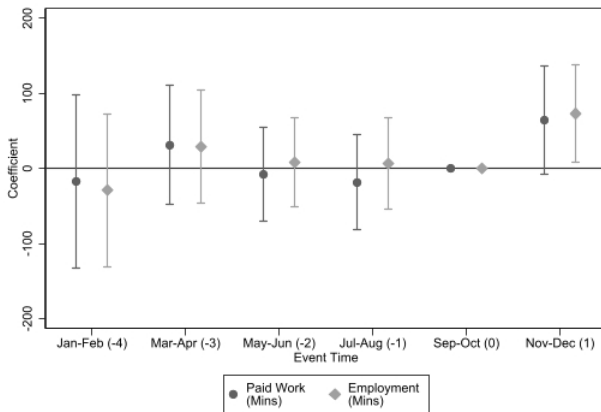Event study with Household Fixed Effects: High MPCE (Above Median) Sample

Note: Point estimates and 90 % confidence intervals reported.

Treatment: Women of Working Age from Delhi
Control: Men of Working Age from Delhi

Event Study

Event study with Household Fixed Effects: Below Median MPCE Sample for Non-working Age Group
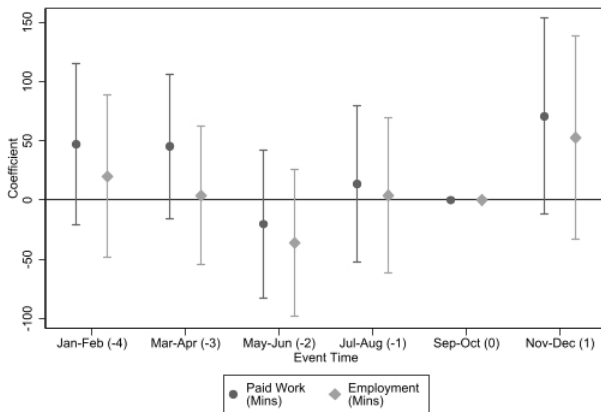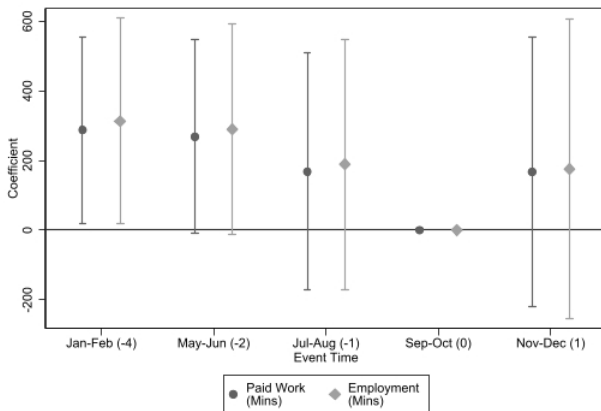

Note: Point estimates and 90 % confidence intervals reported.

Treatment: Women of Non-Working Age from Delhi above 65 years old.
Control: Men of Non-Working Age from Delhi above 65 years old.

Placebo Results

Table 8: DID-I Estimates with Household Fixed Effects:

(Assigning treatment exactly one month before the actual date)

	Paid Work		Employment		Outside Home	
	(1)	(2)	(3)	(4)	(5)	(6)
	Indicator	Mins	Indicator	Mins	Employment	Travel
Female	-0.60***	-340.43***	-0.61***	-368.51***	-339.24***	-39.52***
	(0.02)	(11.70)	(0.02)	(11.45)	(12.28)	(2.88)
Post × Female	-0.00	-18.87	-0.05	-19.42	-35.14	-14.33
	(0.07)	(45.07)	(0.04)	(38.59)	(39.86)	(10.35)
Observations	3775	3775	3775	3775	3775	3775

NOTES: Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. For the purpose of the placebo test we assign treatment exactly one month before the actual date of implementation of pink pass scheme. *Post* takes value 1 in the period 29th September 2019 to 29th October 2019, and is 0 for all the days before that since 1st January 2019. These are DID estimates with urban Delhi women as the treatment group and urban Delhi men as the control group. Dependent variables are either time-use (measured in minutes) or indicators. We use controls in each column as follows: schooling (in years), age (in years) and household fixed effects.

DID 2 Results

Table 9: DID 2 Estimates: Effects by Low and High MPCE categories

	Paid Work		Employment		Outside Home	
	(1)	(2)	(3)	(4)	(5)	(6)
Low MPCE	Indicator	Mins	Indicator	Mins	Employment	Travel
Post × Delhi	0.15**	68.10*	0.16**	71.76*	78.43**	-7.63
N=698	(0.06)	(33.75)	(0.06)	(34.16)	(34.11)	(9.70)
High MPCE	Indicator	Mins	Indicator	Mins	Employment	Travel
Post × Delhi	-0.00	12.86	-0.03	13.16	19.93	-3.74
N=2655	(0.05)	(24.51)	(0.04)	(27.04)	(24.87)	(6.69)

NOTES: Standard Errors, clustered at the district level reported in parenthesis. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. For both sub-population of households, women from neighbouring households act as controls. MPCE less than 2500, is considered as *Low MPCE* and otherwise *High MPCE*. Dependent variables are measured in minutes and indicators. We use controls in each column as follows: schooling (in years), age (in years), household size, schooling of household head (in years), *pucca* house (Indicator), access to clean cooking fuels (Indicator), official caste categories, religion, the month of survey and district fixed effects.

Results: Checking pre-trends DID2

Table 10: **Pre-Trends with Household Fixed effects**: Coefficient for ($Delhi \times t$)

(Control Group: Females in Neighbouring districts of Delhi)

	Paid Work		Employment		Outside Home	
	(1)	(2)	(3)	(4)	(5)	(6)
	Indicator	Mins	Indicator	Mins	Employment	Travel
Unconditional Pre-trends						
Delhi × Week Number	-0.00	0.11	-0.00	-0.29	-0.26	-0.18
N=2905	(0.00)	(0.56)	(0.00)	(0.59)	(0.60)	(0.22)
Delhi × Month Number	-0.00	0.55	-0.01	-1.13	-0.88	-0.67
N=2939	(0.01)	(2.46)	(0.01)	(2.63)	(2.62)	(0.94)
Conditional Pre-trends						
Delhi × Week Number	-0.00	0.05	-0.00	-0.33	-0.28	-0.16
N=2905	(0.00)	(0.48)	(0.00)	(0.54)	(0.55)	(0.21)
Delhi × Month Number	-0.00	0.48	-0.01	-1.29	-0.83	-0.16
N=2939	(0.00)	(2.01)	(0.01)	(2.03)	(2.13)	(0.99)

NOTES: Standard Errors, clustered at district level reported in parenthesis. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. These are estimates of the coefficient of the interaction between the indicator variable *Delhi* and the continuous time variable t. Week number till 43 and months till October (10th month) of 2019 is treated as *Week Number* and *Month Number* in pre-trend period. Neighbouring districts of urban Delhi's women are the control group, and urban Delhi women as the treatment group. Dependent variables are measured in minutes and indicators. We use controls in each column as follows: schooling (in years), age (in years) and household fixed effects.

Results

Table 11: Pre-Trends for DID 2 Low and High MPCE : Coefficient for ($Delhi \times t$)

(Control Group: Female in Neighbouring districts of Delhi)(Week till 43 and Month till October)

	Paid Work		Employment		Outside Home	
	(1)	(2)	(3)	(4)	(5)	(6)
Low MPCE	Indicator	Mins	Indicator	Mins	Employment	Travel
Delhi × Week Number	0.00*	0.69	0.00**	0.61	0.32	0.01
N=563	(0.00)	(0.89)	(0.00)	(0.97)	(1.00)	(0.17)
Delhi × Month Number	0.01	-0.98	0.01	-1.54	-2.64	-0.01
N=571	(0.01)	(6.19)	(0.01)	(6.61)	(6.61)	(0.82)
High MPCE	Indicator	Mins	Indicator	Mins	Employment	Travel
Delhi × Week Number	-0.00	0.16	-0.00	-0.25	-0.12	-0.13
N=2342	(0.00)	(0.71)	(0.00)	(0.83)	(0.82)	(0.27)
Delhi × Month Number	-0.00	1.82	-0.01	-0.11	0.59	0.01
N=2368	(0.01)	(2.88)	(0.01)	(3.38)	(3.29)	(1.25)

Notes: Standard Errors, clustered at urban ward level reported in parenthesis. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.MPCE less than 2500, is considered as *Low MPCE* and otherwise *High MPCE*.Week number till 43 and months till October (10th month) of 2019 is treated as *Week Number* and *Month Number* in pre-trend period.Dependent variables are measured in minutes and indicators. We use controls in each column as follows: schooling (in years), age (in years), household size, schooling of household head (in years), *pucca* house (Indicator), access to clean cooking fuels (Indicator), official caste categories, religion, the month of survey and district fixed effects.

Falsification exercise: checking impacts on males

Table 12: DID 2 Estimates on Male (Falsification test)

Control group is male individuals in Neighbouring districts (16-65 years)

	Paid Work		Employment		Outside Home	
	(1)	(2)	(3)	(4)	(5)	(6)
Full Sample	Indicator	Mins	Indicator	Mins	Employment	Travel
Post × Delhi	-0.01	10.27	0.07	10.50	36.74	9.01
	(0.08)	(38.78)	(0.05)	(40.74)	(49.91)	(9.81)
Observations	4091	4091	4091	4091	4091	4091
Low MPCE	Indicator	Mins	Indicator	Mins	Employment	Travel
Post × Delhi	-0.08	-53.83	0.06	-60.57	-57.63	-21.01
	(0.11)	(63.42)	(0.11)	(58.99)	(60.03)	(16.72)
Observations	708	708	708	708	708	708
High MPCE	Indicator	Mins	Indicator	Mins	Employment	Travel
Post × Delhi	0.01	24.40	0.07	22.43	49.11	12.24
	(0.09)	(41.35)	(0.06)	(44.50)	(53.86)	(10.81)
Observations	3383	3383	3383	3383	3383	3383

Notes: Standard Errors, clustered at urban ward level reported in parenthesis. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.MPCE less than 2500, is considered as *Low MPCE* and otherwise *High MPCE*. Dependent variables are measured in minutes and indicators. We use controls in each column as follows: schooling (in years), age (in years), household size, schooling of household head (in years), *pucca* house (Indicator), access to clean cooking fuels (Indicator), official caste categories, religion, the month of survey and district fixed effects.

Placebo Results in DID2

Table 13: DID 2 Estimates Placebo results (Control Group:Urban Female in Delhi's neighbouring districts)(assigning treatment exactly one month before the actual date)

	Paid Work		Employment		Outside Home	
	(1) Indicator	(2) Mins	(3) Indicator	(4) Mins	(5) Employment	(6) Travel
Post	0.08	34.14	0.10	43.82	28.46	10.68
	(0.12)	(38.84)	(0.12)	(47.66)	(47.84)	(14.35)
Post × Delhi	-0.02	9.17	-0.06	1.38	3.12	-9.29*
	(0.05)	(16.83)	(0.07)	(18.30)	(17.39)	(4.89)
Observations	2916	2916	2916	2916	2916	2916

NOTES: Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$ .Here *Post* takes value 1 in the period 29th September 2019 to 29th October 2019, and is 0 for all the days before that since 1st January 2019. These are DID estimates with urban Delhi women as the treatment group and urban Delhi men as the control group. Dependent variables are either time-use (measured in minutes) or indicators. We use controls in each column as follows: schooling (in years), age (in years), household size, schooling of household head (in years), *pucca* house (Indicator), access to clean cooking fuels (Indicator), official caste categories, religion, the month of survey and district fixed effects.

Results: Triple difference estimates

Table 14: DDD Estimates: by Low and High MPCE categories

	Paid Work		Employment		Outside Home	
	(1)	(2)	(3)	(4)	(5)	(6)
Low MPCE	Indicator	Mins	Indicator	Mins	Employment	Travel
Post × Delhi × Female	0.23**	161.01**	0.17*	156.04**	142.70**	5.52
	(0.11)	(62.26)	(0.10)	(60.99)	(62.32)	(13.59)
Observations	1388	1388	1388	1388	1388	1388
High MPCE	Indicator	Mins	Indicator	Mins	Employment	Travel
Post × Delhi × Female	0.03	4.26	-0.06	10.04	-6.67	-17.18*
	(0.09)	(48.57)	(0.08)	(49.91)	(50.55)	(9.99)
Observations	5741	5741	5741	5741	5741	5741

NOTES: Standard errors are clustered at urban ward level in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$ MPCE less than 2500, is considered as *Low MPCE* and otherwise *High MPCE*. Dependent variables are measured in minutes and indicators. We use controls in each column as follows: schooling (in years), age (in years) and household fixed effects.

Results: Pre-trends in DDD

Table 15: **Pre-Trends** with Househod Fixed effects for Low and High MPCE :
Coefficient for ($Delhi \times Female \times t$): (Week till 43 and Month till October)

	Paid Work		Employment		Outside Home	
	(1)	(2)	(3)	(4)	(5)	(6)
Low MPCE	Indicator	Mins	Indicator	Mins	Employment	Travel
Delhi $\times$ Female $\times$ Week	0.00	2.12	0.00	2.32	2.68	0.34
N=1129	(0.00)	(2.52)	(0.00)	(2.42)	(2.47)	(0.62)
Delhi $\times$ Female $\times$ Month	0.02	11.61	0.02	12.37	13.75	1.51
N=1141	(0.02)	(11.16)	(0.02)	(10.78)	(10.94)	(2.69)
High MPCE	Indicator	Mins	Indicator	Mins	Employment	Travel
Delhi $\times$ Female $\times$ Week	0.00	-1.17	0.00	0.42	0.53	0.49
N=4789	(0.00)	(1.54)	(0.00)	(1.53)	(1.57)	(0.31)
Delhi $\times$ Female $\times$ Month	0.00	-7.74	-0.00	-1.48	-0.96	1.65
N=4837	(0.01)	(6.52)	(0.01)	(6.43)	(6.60)	(1.31)

NOTES: Standard Errors, clustered at the urban ward level reported in parenthesis. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.
MPCE less than Rs 2500 is considered as *Low MPCE* and otherwise *High MPCE*. Week number till 43 and months till October (10th
month) of 2019 is treated as *Week Number* and *Month Number* in pre-trend period. Dependent variables are measured in minutes and
indicators. We use controls in each column as follows: schooling (in years), age (in years) and household fixed effects.

Results

Table 16: DDD Placebo test :assigning treatment exactly one month before the actual date

Full Sample	Paid Work		Employment		Outside Home	
	(1)	(2)	(3)	(4)	(5)	(6)
	Indicator	Mins	Indicator	Mins	Employment	Travel
Post $\times$ Delhi $\times$ Female	0.09	15.23	0.03	13.79	0.88	-21.37*
	(0.14)	(83.79)	(0.14)	(79.00)	(80.62)	(12.33)
Observations	5936	5936	5936	5936	5936	5936

NOTES: Standard errors are clustered at urban ward level in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. The treated group (Post) is exactly one month back compared to the actual date of implementation of pink pass scheme.That is,the days from 29th September 2019 to 29th October 2019 is our treatment group which takes value 1, and all the days before that since 1st January 2019 is our control group which takes value 0. Dependent variables are measured in minutes and indicators. We use controls in each column as follows: schooling (in years), age (in years) and household fixed effects.

Results

- We find significant increases in time-use on paid work & employment

- For women in the marginalised group in the age group of 16-65 years:

  - Time-spent on paid work increases by almost over an hour

  - Work participation increases by 15 to 25 percent for women

    - Results are robust to alternative definitions of poor categories (using education categories & sweeping type in household)

Conclusion

- Limited female mobility widely recognized as barrier to development (Klugman et al. 2014; Jayachandran 2015)
- Our study demonstrates a large impact of a gendered transport subsidy on women's labour supply
  - Large & statistically significant effects for poorer households
  - Has important policy implications for the design of urban public transport
- The positive gains on employment is suggestive of bottlenecks that impede participation in the labour market
- We are able to examine the short term impact, it would be interesting to see the effects in the long term
  - Since 2019, a number of Indian states have adopted the a policy of gender specific public transport subsidy (Tamil Nadu Zero Ticket Bus Travel Scheme for Women (2021), Nari ko Naman Scheme in Himachal Pradesh (2022), Shakti Scheme in Karnataka (2023)

Thank you!

Appendix

Appendix

Table 17: Summary of the Control Variables

	Neighbour Districts (N=443)	Delhi (N=645)
Post		
Pre	318 (71.9%)	460 (73.1%)
Post	124 (28.1%)	169 (26.9%)
Household Size	3.96 (2.20)	3.99 (1.98)
Schooling-HH Head (Years)	8.79 (5.64)	8.83 (5.29)
Religion		
Hinduism	341 (77.0%)	409 (63.4%)
Islam	76 (17.2%)	146 (22.6%)
Christianity	6 (1.4%)	16 (2.5%)
Caste		
Scheduled Tribe	16 (3.6%)	64 (9.9%)
Scheduled Caste	117 (26.4%)	151 (23.4%)
Other Backward Class	148 (33.4%)	161 (25.0%)
LPG-ONG Access	369 (83.3%)	623 (96.6%)
Pucca House	384 (86.7%)	573 (88.8%)

Appendix

Table 18: Summary of the Sample Data: Pre Vs Post Treatment Periods

	Delhi		Neighbour Districts	
	Men	Women	Men	Women
Pre-Period	(N=2,142)	(N=1,867)	(N=1,253)	(N=1,060)
Paid Work				
Indicator	0.72 (0.45)	0.13 (0.34)	0.74 (0.44)	0.15 (0.36)
Minutes	390.47 (271.52)	55.86 (158.07)	378.46 (246.66)	61.58 (158.75)
Employment				
Indicator	0.76 (0.43)	0.15 (0.36)	0.75 (0.43)	0.16 (0.37)
Minutes	426.34 (278.49)	63.07 (171.90)	408.68 (261.38)	69.00 (173.29)
Outside Home				
Employment Minutes	390.89 (287.79)	57.79 (165.50)	395.22 (268.24)	65.09 (169.65)
Travel Minutes	60.04 (78.09)	20.95 (68.70)	69.27 (58.54)	20.09 (47.12)
Post period	(N=471)	(N=389)	(N=259)	(N=201)
Paid Work				
Indicator	0.67 (0.47)	0.17 (0.38)	0.70 (0.46)	0.13 (0.34)
Minutes	348.49 (275.10)	72.65 (175.42)	337.18 (237.41)	50.30 (134.33)
Employment				
Indicator	0.77 (0.42)	0.19 (0.39)	0.71 (0.45)	0.16 (0.37)
Minutes	385.88 (282.30)	83.95 (198.11)	373.32 (261.11)	60.30 (157.35)
Outside Home				
Employment Minutes	378.69 (285.32)	83.32 (197.80)	365.91 (265.92)	54.78 (152.66)
Travel Minutes	66.25 (80.40)	20.29 (42.72)	64.05 (47.04)	19.40 (38.76)

Individual Level Variables

Appendix

Table 19: DID I with household fixed effects: by <u>household education</u> categories

	Paid Work		Employment		Outside Home	
	(1)	(2)	(3)	(4)	(5)	(6)
< 10 years of Edu	Indicator	Mins	Indicator	Mins	Employment	Travel
Post × Female	0.12	73.76	0.03	71.07*	46.52	-11.78
	(0.08)	(45.00)	(0.06)	(40.89)	(43.62)	(13.16)
Observations	1639	1639	1639	1639	1639	1639
≥ 10 years of Edu	Indicator	Mins	Indicator	Mins	Employment	Travel
Post × Female	0.06	40.18	-0.01	44.64	25.26	-7.83
	(0.07)	(36.68)	(0.06)	(36.03)	(35.89)	(7.52)
Observations	2919	2919	2919	2919	2919	2919

NOTES: Standard errors are clusterd at urban ward level in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$ .Dependent variables are measured in minutes and indicators. We use controls in each column as follows: schooling (in years), age (in years) and household fixed effects.

Appendix

Table 20: DID I withhousehold fixed effects: by type of sweeping categories

	Paid Work		Employment		Outside Home	
	(1)	(2)	(3)	(4)	(5)	(6)
Manual by HH	Indicator	Mins	Indicator	Mins	Employment	Travel
Post $\times$ Female	0.11*	77.07**	0.01	72.10**	56.71*	-13.20
	(0.06)	(32.30)	(0.04)	(30.43)	(30.72)	(8.21)
Observations	3027	3027	3027	3027	3027	3027
Mechanical + Outsourcing	Indicator	Mins	Indicator	Mins	Employment	Travel
Post $\times$ Female	0.04	16.91	0.00	33.41	-1.91	-1.34
	(0.11)	(58.81)	(0.09)	(56.72)	(56.33)	(7.84)
Observations	1531	1531	1531	1531	1531	1531

NOTES: Standard errors are clustered at urban ward level in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Dependent variables are measured in minutes and indicators. We use controls in each column as follows: schooling (in years), age (in years) and household fixed effects.

Appendix

Table 21: Triple DDD with household fixed effects: by <u>household education</u> categories

	Paid Work		Employment		Outside Home	
	(1)	(2)	(3)	(4)	(5)	(6)
< **10 years of Edu**	Indicator	Mins	Indicator	Mins	Employment	Travel
Post × Delhi × Female	0.22*	119.48*	0.14	125.85*	108.53	-8.64
	(0.12)	(68.78)	(0.11)	(64.89)	(66.64)	(15.05)
Observations	2519	2519	2519	2519	2519	2519
≥ **10 years of Edu**	Indicator	Mins	Indicator	Mins	Employment	Travel
Post × Delhi × Female	0.02	6.47	-0.07	8.96	-4.53	-12.44
	(0.09)	(48.29)	(0.08)	(49.03)	(49.60)	(10.57)
Observations	4610	4610	4610	4610	4610	4610

NOTES: Standard errors are clustered at urban ward level in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Dependent variables are measured in minutes and indicators. We use controls in each column as follows: schooling (in years), age (in years) and household fixed effects.

Appendix

Table 22: Triple DDD with household fixed effects: by type of sweeping categories

	Paid Work		Employment		Outside Home	
	(1)	(2)	(3)	(4)	(5)	(6)
Manual by HH	Indicator	Mins	Indicator	Mins	Employment	Travel
Post × Delhi × Female	0.09	58.44	-0.01	53.41	42.13	-15.12
	(0.08)	(47.01)	(0.07)	(47.71)	(49.43)	(10.44)
Observations	5245	5245	5245	5245	5245	5245
Mechanical + Outsourcing	Indicator	Mins	Indicator	Mins	Employment	Travel
Post × Delhi × Female	-0.00	-36.16	-0.08	-12.82	-31.42	-10.93
	(0.19)	(87.88)	(0.17)	(99.04)	(98.84)	(13.24)
Observations	1884	1884	1884	1884	1884	1884

NOTES: Standard errors are clustered at urban ward level in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Dependent variables are measured in minutes and indicators. We use controls in each column as follows: schooling (in years), age (in years) and household fixed effects.

Appendix

Table 23: DID 1 with household fixed effects removing top 1 percentile
(Control Group: Urban Male in Delhi: 16-65 years)

	Paid Work		Employment		Outside Home	
	(1)	(2)	(3)	(4)	(5)	(6)
	Indicator	Mins	Indicator	Mins	Employement	Travel
Female	-0.60***	-337.77***	-0.61***	-365.58***	-338.32***	-37.82***
	(0.02)	(11.46)	(0.02)	(11.19)	(11.93)	(2.69)
Post × Female	0.08	53.89*	0.01	59.74*	36.84	-4.68
	(0.06)	(32.02)	(0.04)	(30.61)	(31.15)	(4.46)
Observations	4558	4524	4558	4505	4513	4512

NOTES: Standard errors, clustered at urban ward level reported in parenthesis. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. These are DID estimates with urban Delhi women as the treatment group and urban Delhi men as the control group. Dependent variables are either indicators or in minutes. We use controls in each column as follows: schooling (in years), age (in years) and household fixed effects.

Appendix

Table 24: DID 1 with <u>household fixed effects</u> removing top 1 percentile: effects by Low and High MPCE categories (Control Group: Urban Male in Delhi: 16-65 years)

	Paid Work		Employment		Outside Home	
	(1)	(2)	(3)	(4)	(5)	(6)
Low MPCE	Indicator	Mins	Indicator	Mins	Employement	Travel
Post × Female	0.12	101.03***	0.06	101.92***	84.20**	-8.56
	(0.07)	(38.21)	(0.05)	(35.15)	(36.72)	(8.42)
Observations	727	726	727	726	726	722
High MPCE	Indicator	Mins	Indicator	Mins	Employement	Travel
Post × Female	0.08	46.45	0.00	53.29	29.58	-4.04
	(0.07)	(36.74)	(0.05)	(36.04)	(36.24)	(4.95)
Observations	3831	3798	3831	3779	3787	3790

NOTES: Standard errors, clustered at urban ward level reported in parenthesis. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. These are DID estimates with urban Delhi women as the treatment group and urban Delhi men as the control group. MPCE less than 2500, is considered as *Low MPCE* and otherwise *High MPCE*. Dependent variables are either indicators or in minutes. We use controls in each column as follows: schooling (in years), age (in years) and household fixed effects.

Appendix

Table 25: DID 2 estimates removing top 1 percentile
(Control Group: Urban Female in Delhi's neighbouring districts)

	Paid Work		Employment		Outside Home	
	(1)	(2)	(3)	(4)	(5)	(6)
	Indicator	Mins	Indicator	Mins	Employement	Travel
Post	0.12	72.35	0.11	75.93	57.44	9.77
	(0.13)	(65.24)	(0.14)	(63.96)	(65.29)	(6.97)
Post × Delhi	0.03	20.00	0.01	13.19	20.24	-2.28
	(0.04)	(18.75)	(0.04)	(19.75)	(17.94)	(4.49)
Observations	3493	3464	3493	3461	3465	3469

NOTES: Standard Errors, clustered at the district level reported in parenthesis. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. These are DID estimates with urban Delhi women as the treatment group and neighbouring district urban women as the control group. Dependent variables are either indicators or in minutes. We use controls in each column as follows: schooling (in years), age (in years), household size, schooling of household head (in years), *pucca* house (Indicator), access to clean cooking fuels (Indicator), official caste categories, religion, the month of survey and district fixed effects.

Appendix

Table 26: DID 2 by removing top 1 percentile : effects by Low and High MPCE: (Control Group: Urban Female in Delhi's neighbouring districts)

	Paid Work		Employment		Outside Home	
	(1)	(2)	(3)	(4)	(5)	(6)
Low MPCE	Indicator	Mins	Indicator	Mins	Employement	Travel
Post × Delhi	0.15^{**}	46.35	0.16^{**}	47.01	53.99	-11.15
	(0.06)	(32.98)	(0.06)	(34.73)	(35.02)	(8.14)
Observations	698	693	698	692	694	697
High MPCE	Indicator	Mins	Indicator	Mins	Employement	Travel
Post × Delhi	0.00	12.37	-0.03	4.65	11.94	-0.73
	(0.05)	(23.26)	(0.04)	(23.99)	(22.69)	(5.39)
Observations	2795	2771	2795	2769	2771	2772

NOTES: Standard Errors, clustered at the district level reported in parenthesis. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. These are DID estimates with urban Delhi women as the treatment group and neighbouring district urban women as the control group. MPCE less than 2500, is considered as *Low MPCE* and otherwise *High MPCE*. Dependent variables are either indicators or in minutes. We use controls in each column as follows: schooling (in years), age (in years), household size, schooling of household head (in years), *pucca* house (Indicator), access to clean cooking fuels (Indicator), official caste categories, religion, the month of survey and district fixed effects.

Appendix

Table 27: Triple DDD with <u>household fixed effects removing top 1 percentile</u>

	Paid Work		Employment		Outside Home	
	(1)	(2)	(3)	(4)	(5)	(6)
Full Sample	Indicator	Mins	Indicator	Mins	Employment	Travel
Post × Delhi × Female	0.07	35.84	-0.02	48.16	31.77	-6.79
	(0.08)	(46.32)	(0.07)	(46.39)	(47.86)	(7.60)
Observations	7129	7035	7129	7046	7054	7048
Low MPCE	Indicator	Mins	Indicator	Mins	Employment	Travel
Post × Delhi × Female	0.23**	155.75**	0.17*	161.28***	150.63**	0.59
	(0.11)	(62.48)	(0.10)	(61.30)	(62.68)	(13.57)
Observations	1388	1371	1388	1380	1380	1382
High MPCE	Indicator	Mins	Indicator	Mins	Employment	Travel
Post × Delhi × Female	0.03	6.33	-0.06	20.80	3.35	-9.92
	(0.09)	(48.54)	(0.08)	(49.35)	(50.29)	(8.04)
Observations	5741	5664	5741	5666	5674	5666

NOTES: Standard errors are clustered at urban ward level in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Dependent variables are measured in minutes and indicators. MPCE less than 2500, is considered as *Low MPCE* and otherwise *High MPCE*. We use controls in each column as follows: schooling (in years), age (in years) and household fixed effects.

Event Study

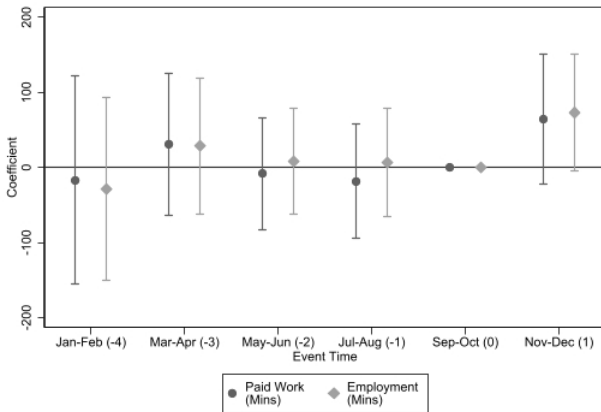Full Sample Event study with Household Fixed Effects: At 95 % Confidence Intervals
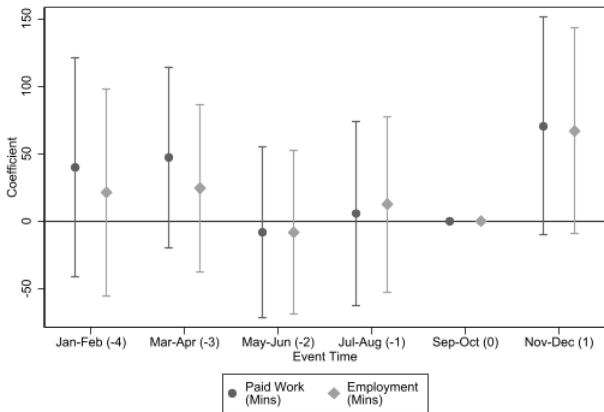
Note: Point estimates and 95 % confidence intervals reported.

Treatment: Women of Working Age from Delhi
Control: Men of Working Age from Delhi

Event Study

Low MPCE (Below Median) Sample (with household fixed effects: <u>At 95% Confidence Interval</u>

Note: Point estimates and 95 % confidence intervals reported.

Treatment: Women of Working Age from Delhi
Control: Men of Working Age from Delhi