Relaxing of Gendered Social Norms Drives Saudi Women to Work

Ashwin Belur

December 2025

Abstract

Gendered social norms can have a strong impact on women's empowerment and their ability to fully participate in, contribute to, and benefit from the opportunities available in their society. These norms can be visible or hidden and can have significant effect on women's ability to leverage opportunities. In this paper we utilize an event-study model to estimate the effect of legalizing women's right to drive standard vehicles on the female labor force participation rate. We estimate this effect using Saudi Arabia and Qatar representing the only two countries recently legalizing driving of automobiles for women. We also estimate the effect for Afghanistan representing a country making driving illegal for women.

We estimate the treatment effect using two methodologies. First, we estimate the annual post-treatment effect individually by country using an interrupted time series (ITS) model with a linear time trend. The paper's core finding is a persistent effect for Saudi Arabia that grows to a level greater than 12% and is statistically significant. In Saudi Arabia, we find a short phase-in period where the effect grows from 3.5% in the treatment year to 12.9% two years later, where it remains persistent at a level over 12%. We also find a -13% treatment effect for Afghanistan. Second, using a two-way country fixed effects model with a linear time trend. However, this treatment effect is not significant and we cannot rule out the null hypothesis.

1 Background

Following the Arab Spring in 2011 two countries (Saudi Arabia and Qatar) have lifted bans on women's ability to get driving licenses and operate automobiles themselves.

On September 26, 2017 King Salman bin Abdulaziz Al Saud son of the founder of Saudi Arabia issued a statement recognizing the right for Saudi women to drive (*Saudi Arabia driving ban on women to be lifted* 2017). Licenses began to be issued mid-year 2018. Prince Mohammed bin Salman (MBS), the defacto ruler, also supported the change. While the ban was lifted and licenses began to be issued in 2018 there continued to be struggles for certain 'Women to Drive' campaigners.

In neighboring Qatar, the requirement for a male guardian for women to receive a license was removed in January 2020 (Reference)

Theses changes in the governing laws are important changes in liberating women and lowering their implicit and explicit transportation costs. Prior to the changes women would have traveled predominately with a male member of the family or relied on independent male drivers.

Public opinion (Cuthbert, 2018) appeared in favor of the changes in Saudi Arabia. An Arab/YouGov poll of 500 Saudi's residing in the Kingdom showed 82% of women and 71% of men not angry, sad, or offended by the decision. While, only 21% of men were happy or excited by it contrasting with, a higher, 38% of women.

(Duflo, 2012) notes the bidirectional relationship between economic development and women's empowerment. Duflo quoted James Wolfensohn and cites two claims. First, that empowerment of women would change outcomes. Second, this change would be positive. This paper supports this thesis.
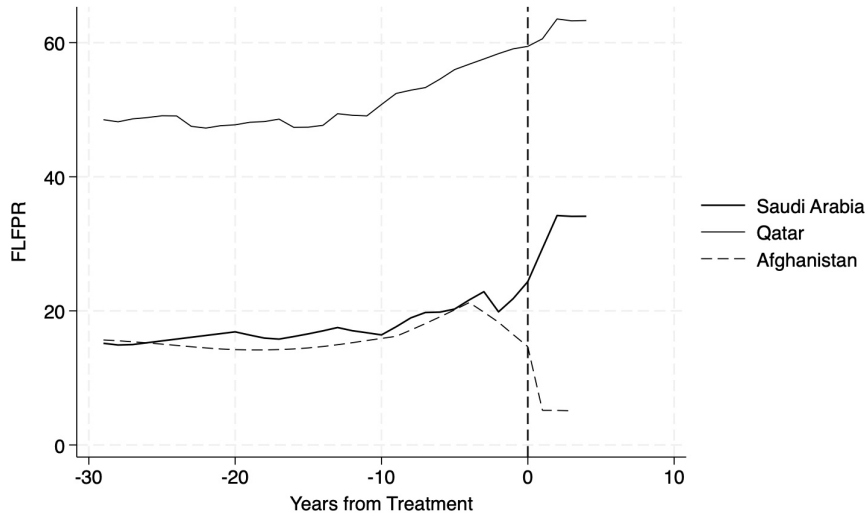
We exploit this specific change in circumstances and a natural experiment in Saudi Arabia and Qatar and estimate the impact on the female labor force participation rate (FLFPR). We note, there is only one other country since 2000 where such a change existed and this is in Afghanistan. Here, the change occurred, but in the opposite direction. Since May 2022, with the resurgence of the Taliban in August 2012 new issuance of licenses have ceased and sometimes severe restrictions have been placed on women in relation to driving alone.

2 Data

We use annual data sourced from the World Bank Group from 1990 to 2024. The FLFPR is based on the ILO modeled estimate database. We shift the data to align the year of treatment being the first year women were legally allowed (or disallowed) to drive. This was 2019 for Saudi Arabia, six months after the ban was lifted and licenses began to be issued), 2020 for Qatar, and 2021 for Afghanistan. This allowed for five time periods in the post-treatment era for Saudi Arabia and Qatar. However, based on the available data this formal change has been anticipated and likely implemented informally as well over previous years.

We show the FLFPR for both countries and the time period from the treatment year, aligned to the treatment year for Saudi Arabia.

Figure 1: FLFPR for treated countries relative to treatment year

The three countries data for the FLFPR are shifted to coincide with the relevant treatment year in Saudi Arabia.

3 Methodology

We consider two models. First, we consider an interrupted time series (ITS) model for each of the three countries separately. Second, a joint two-way fixed effects (TWFE) model combining the data from Saudi Arabia and Qatar. The

use of these methods is driven by the fact that we do not have a set of control countries.

First, we utilize an interrupted time series (ITS) model with a linear time trend for each of the three countries individually as specified below. Where Y_t is the FLFPR at time t, D_t are separate dummy variables for each post-treatment time period, and β_t are the parameters of interest and indicate the treatment effect in each post treatment period.

$$y_t = \beta_0 + \beta_1 t + \sum_{t=2020}^{2024} \beta_t D_t + \gamma \ln\left(GDPPerCapita\right) + \epsilon_t \qquad (1)$$

Second, we utilize a parsimonious event-study model, which is an extension of the standard difference in difference model, to estimate the effect of relaxed regulations on women driving on the FLFPR. We adopt a TWFE model with country fixed effects, a common linear time trend, and separate treatment dummy variables (D_i) for each of the five years at or post-treatment (2020 to 2024).

$$Y_{ct} = \beta_0 t + \sum_{t=2020}^{2024} \beta_t D_t + \gamma \ln\left(GDPPerCapita\right) + \mathbf{a}X + (\alpha_c + \epsilon_{ct}) \qquad (2)$$

Y_{ct} is the FLFPR in country c at time t. Country fixed-effects α_c are relative to Saudi Arabia and combined with the error term ϵ_{it}. β_t are the parameters of interest and indicate the average treatment effect in each of the five post-treatment years. From this, we can estimate the size of the effect, the phase-in period, and its persistence. We control for GDP per capita and can control for other covariates, however, at this stage, we have not included any other covariates in the variable X.

Our estimation strategy is based on a within-transformation or demeaning process typically used with TWFE models (using STATA module **xtreg**) (Woolridge, 2010).

4 Results

In this section, we summarize our results across the two methodologies.

Our first methodology separates the data by country and utilizes an ITS model. This methodology clearly distinguishes and estimates the effect for Saudi Arabia and Afghanistan with significance, while for Qatar we do not find a consistent significant effect over time.

For Saudi Arabia, the statistically significant effect grows from 3.5% in the treatment year to 8.4% one year later and remains persistently above 12% from two to four years later. The results across all three countries are shown in table 1 and the annual treatment effects for Saudi Arabia are shown in figure 2. The growth in the treatment effects be a result of the time required for women to get licenses and gain formal employment.

The estimated treatment effect in Saudi Arabia grows over time to a level over 12% two years after the relaxation of the restrictions. This may indicate, that the ability to get the license and get a job takes some time, but after two years the effect is persistent at or above 12% level. Given the long running campaign fighting for women's right to drive, this also raises the question if the treatment effect is underestimated and if women anticipated the change and prepared for it ahead of time. Separately, however, we do not identify any consistent significant treatment effect in Qatar.

Table 1: Estimation (by Country) of Annual Treatment Effect using an ITS Model from 2019 to 2024

	Qatar		Afghanistan		Saudi Arabia	
	Est	SE	Est	SE	Est	SE
Time Trend	0.69***	(0.09)	0.36***	(0.09)	0.19***	(0.05)
Treatment Year	-0.45	(2.10)	-5.63***	(1.64)	3.46***	(1.12)
T+1	1.43	(2.00)	-15.49***	(1.69)	8.41***	(1.16)
T+2	4.62**	(1.96)	-15.74***	(1.66)	12.86***	(1.14)
T+3	3.21	(2.04)	0.00	(.)	12.37***	(1.16)
T+4	2.35	(2.10)	0.00	(.)	12.25***	(1.15)
GDP per Capita	-4.38***	(1.11)	-0.71	(1.07)	0.99	(1.14)
Observations	34		24		34	

** indicates significance at the 95% level and *** indicates significance at the 99% level. (Take 0's out of Afghanistan column.
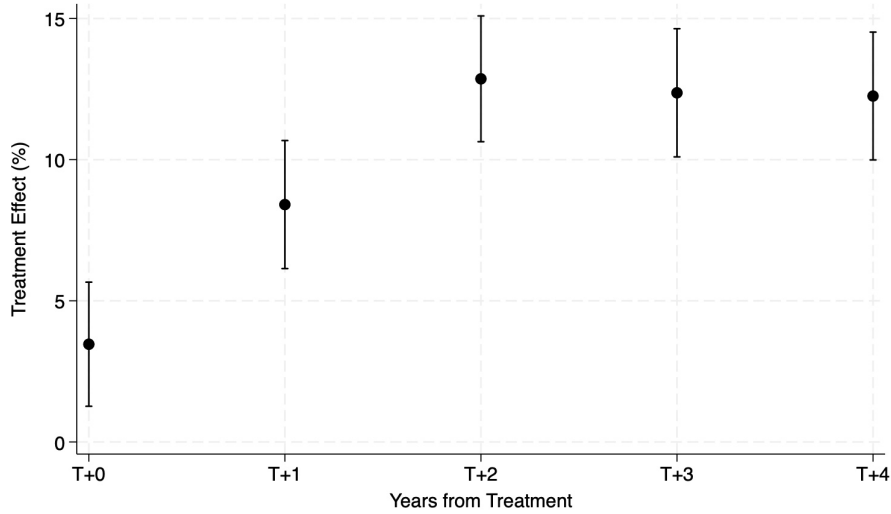
Finally, in striking contrast to Saudi Arabia, in Afghanistan we find a -

13% treatment effect in the treatment year and the following year. This is not surprising giving the strength and repression in the country governed by the Taliban. (Reference)

The very strong and significant effect identified in Saudi Arabia as compared to Qatar may be indicative of the pre-treatment environment in each country and of a more gender repressive culture and governance environment in Saudi Arabia as compared to Qatar. The difference could also, potentially, be interpreted as women in Saudi Arabia having less sway in household bargaining, thereby, creating more opportunity for improvements when a constraint is released.

We note the attribution of the change in the FLFPR to the change in regulations for female drivers may be confounded by other events. for instance in Saudi Arabia, since 2017, with the appointment of MBS as the crown prince of Saudi Arabia many other policies have changes. These included the introduction of the Vision 2030 and the weakening of the male guardianship system in 2019 among others. The estimated effect may be confounded by these or others changes in governmental policy.

Figure 2: Annual Treatment Effect using ITS model is persistent for Saudi Arabia

This plot has been manually created from the regression data with 95% confidence intervals.

Second, we show the results of the TWFE model in tables 2 and 3 below.

The post-treatment estimators are positive, but not significant after controlling for GDP per capita. We find a phase-in period as the effect size grows from the treatment year to two years after treatment and then the ATT stabilizes at close to the 8-9% level.

The estimates using the TWFE model are not significant after controlling for the linear time trend. It is likely that with only two countries in the panel dataset there is not enough data to make inferences. Additionally, as seen in the results from the ITS model, the treatment effect for Qatar is not large and not significant.

Table 2: Event-Study Estimation of Annual Treatment Effect from 2019 to 2024

	Event Study	SE
Treatment Year	2.92	(1.57)
T+1	5.67	(3.33)
T+2	9.53	(4.08)
T+3	9.01	(4.46)
T+4	8.61	(4.78)
GDP per Capita	-1.18	(2.23)
Observations	68	

** indicates significance at the 95% level and *** indicates significance at the 99% level.

We also show in table 2 below the results with only one post-treatment dummy variable and the results are similar in levels and consistent with the event-study model above, though still not significant.

Table 3: Estimation of Average Treatment Effect from 2019 to 2024

	Event Study	SE
D	7.15	(3.39)
GDP per Capita	-0.81	(2.32)
Time	0.35	(0.21)
Constant	37.40	(20.74)
Observations	68	

** indicates significance at the 95% level and *** indicates significance at the 99% level.

Despite our limited dataset, we also test the parallel trends assumption by including dummy variables for all time periods except the treatment period. We

find no pre-treatment period estimate significant supporting the parallel trends assumption.

5 Conclusions

The main findings based on the results of utilizing an ITS Model are our estimation and identification of a statistically significant treatment effect of greater than 12% from two to four years after the treatment in Saudi Arabia. The treatment effect grows from the treatment year 3.5% to 8.4% in the first year after treatment. This supports the pathway from relaxation of gendered social norms to greater participation in the labor force. Also consistent with the role of gendered social norms, in Afghanistan we find a statistically significant 13% reduction in the FLFPR in the treatment year and the following year. While in Qatar, we do not find any consistent statistically significant effect.

This is likely due to the stronger levels of governance and repression in Saudi Arabia prior to the reforms and in Afghanistan after the reforms as compared to Qatar.

Utilizing a TWFE model with a very limited dataset with just two countries and just over 30 years of data we estimate an impact of legalizing driving on women's participation in the labor force. The effect is large in relation to the based level of the FLFPR and growing to just over 9.5% 2 years after treatment, and persistent, remaining at the 8.6% level four years after treatment. However, the effect is not statistically significant.

6 Limitations / Open Questions

The key open questions that will require investigation and further data relates to gaining a better understanding of what jobs these women took up and who held them before?

- Did these women take jobs previously held by local men?

- Did these women take jobs previously held by other immigrants?

- Did the economy and employment grow to take on more female workers?

- What employment sector did these women take jobs in?

- Is there a way we can include the data for Afghanistan using a negative treatment or potentially reversing the time series (not enough data).

- Could you use a Synthetic Control Method?

- Inclusion of other controls (educational changes, oil prices, general employment rates)

- It is not at all obvious when the discontinuity in governance is for Afghanistan. This is due to war, ISIS, and the Taliban.

References

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