

Problem Set #[1]
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Problem 1 Classify a model from a journal

Part (a). The AER paper entitled “Can Alcohol Prohibition Reduce Violence Against Women” established statistical models to examine the impact of state-level prohibition on alcohol consumption and violence against women in India.

Part (b). Luca, Dara Lee, Emily Owens, and Gunjan Sharma. ”Can alcohol prohibition reduce violence against women?.” *American Economic Review* 105, no. 5 (2015): 625-29.

Part (c). The effect of prohibition on the drinking behavior of husband:

$$P(\text{Husband Drink}_{hsy} = \text{Yes}) = \gamma_y + \text{Prohibition}_{sy}\beta^{FS} + X_{sy}\delta + H_{hsy}\theta + W_{hsy}\tau + u_{hsy} \quad (1)$$

where γ_y are survey year fixed effects; Prohibition_{sy} is a binary variable representing if the state has a blanket alcohol ban in survey year; H_{hsy} and W_{hsy} denote sociodemographic characteristics of the husband and wife including their age, education, religion, and whether he or she works in a white-collar occupation; X_{sy} captures systematic differences between states such as state literacy rate, urbanization, per capita GDP, the unemployment rate, police and police expenditure per capita, the percent of adults who are male, and the state health and education expenditure per capita.

The reduced form impact of prohibition on domestic violence:

$$P(DV_{hsy} = \text{Yes}) = \gamma'_y + \text{Prohibition}_{sy}\beta^{RF} + X_{sy}\delta' + H_{hsy}\theta' + W_{hsy}\tau' + \omega_{hsy} \quad (2)$$

The only difference from equation (1) is that the dependent variable is now the likelihood that the wife reports being beaten by her husband.

The impact of prohibition on other crimes against women:

$$\text{CrimeAgainstWomen}_{sy} = \gamma_s + \delta_y + \text{Prohibition}_{sy}\beta + X_{sy}\theta + \varepsilon_{sy} \quad (3)$$

where δ_y are year fixed effects, Prohibition_{sy} is equal to 1 if the state has a prohibition policy in the particular year and X_{sy} is the same matrix of state-level controls used in equations (1) and (2).

Part (d).
Exogeneous Variables:

In (1): $P(Husband\ Drink_{hsy} = Yes)$, $Prohibition_{sy}$, X_{sy} , H_{hsy} and W_{hsy} ;

In (2): $P(DV_{hsy} = Yes)$, $Prohibition_{sy}$, X_{sy} , H_{hsy} and W_{hsy} ;

In (3): $CrimeAgainstWomen_{sy}$, $Prohibition_{sy}$ and X_{sy} .

Endogeneous Variables:

In (1): γ_y , β^{FS} , δ , θ , τ and u_{hsy} ;

In (2): γ_y , β^{RF} , δ' , θ' , τ' and ω_{hsy} ;

In (3): γ_s , δ_y , β , θ and ε_{sy} .

Part (e). The models are static, linear and deterministic.

Part (f). Aizer(2010) [1] points out that the decreases in the gender wage gap reduce domestic violence, which aligns with a household bargaining model. Therefore, the spouse wage gap might be significant in the model as an indicator of women's bargaining power.

Problem 2 Make your own model

Part (a).- Part (c). A logistic model is chosen to predict an individual's marital decision.

$$Y_i = \begin{cases} 0, & \text{if } P_i < 0.5 \\ 1, & \text{if } P_i \geq 0.5 \end{cases} \quad (4)$$

where

$$P_i = \frac{1}{a + e^{-z_i}} \quad (5)$$

where

$$z_i = \beta_0 + \beta_1 \text{Age}_i + \beta_2 \text{Race}_i + \beta_3 \text{Education}_i + \beta_4 \text{Occupation}_i + \beta_5 \text{Income}_i + \beta_6 \text{Dating}_i + \beta_7 \text{Cohabitation}_i \quad (6)$$

The independent variables are (1) the age of the individual, (2) the ethnicity, (3) the years of schooling, (4) the individual's current or most recent occupation; (5) the economic status, (6) the number of dates in the past six months and (7) whether the individual had ever cohabited with the significant other.

Part (d). The key factors are Income_i , Dating_i and Cohabitation_i . Bulcroft et al.(1993) [2] empirically discovered that the marriage rates are lower among those who place greater emphasis on having economic supports from others. Also, the degree of affinity with the partner, which is measured by the frequency of dates and whether the individual had cohabited with the parter, plays an indispensable role in accordance with Bulcroft et al.(1993) [2].

Part (e). The reason why I chose the factors in equation (6) is that those determinants are frequently included in published papers [1] [2] [3] [4] . Based on intuitive explanation and observation on married acquaintances, these influencers exert an impact on individual's marriage entry decision. I exclude variables such as the zodiac sign of the individual because it exerts an uncertain effect per relevant researches [5].

Part (f). For the preliminary test, we first collect a dataset containing a bunch of married and unmarried couples from the census bureau and the government's marriage record. Then we randomly split the observations into training and test sets. After running the logistic model on the train set, we obtain the estimated parameters, which can be employed to forecast the marriage entry decision of the individuals in the test set. If the predicted results match with the outcomes in real life and the p-values of the parameter estimates are reasonably small, we may conclude that the model is valid.

References

- [1] Anna Aizer. The gender wage gap and domestic violence. *American Economic Review*, 100(4):1847–59, 2010.
- [2] Richard A Bulcroft and Kris A Bulcroft. Race differences in attitudinal and motivational factors in the decision to marry. *Journal of Marriage and Family*, 55(2):338, 1993.
- [3] Jenna Mahay and Alisa C Lewin. Age and the desire to marry. *Journal of Family Issues*, 28(5):706–723, 2007.
- [4] Sandra L McGinnis. Cohabiting, dating, and perceived costs of marriage: A model of marriage entry. *Journal of Marriage and Family*, 65(1):105–116, 2003.
- [5] Charles S Reichardt. Testing astrological predictions about sex, marriage, and selfishness. *Skeptic (Altadena, CA)*, 15(4):40–46, 2010.