STATA assignment – group 2
"Rule of law and female entrepreneurship"
N. Ashraf, A. Delfino, E. L. Glaeser (2019)

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Task 1: Getting started with your data

Do.file has been created under the name of "Group2.do".

The analysis of the paper considers 139 observations. Each observation represents a country in the world. The countries included are the following: Afghanistan, Albania, Angola, Antigua and Barbuda, Argentina, Armenia, Bahamas, Bangladesh, Barbados, Belarus, Belize, Benin, Bhutan, Bolivia, Bosnia and Herzegovina, Botswana, Brazil, Bulgaria, Burkina Faso, Burundi, Cambodia, Cameroon, Cape Verde, Central African Republic, Chad, Chile, China, Colombia, Congo, Cote d'Ivoire, Croatia, Cyprus, Czech Republic, Democratic Republic of Congo, Djibouti, Dominica, Dominican Republic, Ecuador, Egypt, El Salvador, Eritrea, Estonia, Ethiopia, Fiji, Gabon, Gambia, Georgia, Ghana, Greece, Grenada, Guatemala, Guinea, Guinea-Bissau, Guyana, Honduras, Hungary, India, Indonesia, Iraq, Israel, Italy, Jamaica, Jordan, Kazakhstan, Kenya, Kosovo, Laos, Lebanon, Lesotho, Liberia, Lithuania, Macedonia, Madagascar, Malawi, Malaysia, Mali, Malta, Mauritania, Mauritius, Mexico, Micronesia, Moldova, Mongolia, Montenegro, Morocco, Mozambique, Myanmar, Namibia, Nepal, Nicaragua, Niger, Nigeria, Pakistan, Palestine, Panama, Papua New Guinea, Paraguay, Peru, Philippines, Poland, Portugal, Romania, Russia, Rwanda, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Samoa, Senegal, Serbia, Sierra Leone, Slovak Republic, Slovenia, Solomon Islands, South Africa, South Sudan, Sri Lanka, Sudan, Suriname, Swaziland, Tajikistan, Tanzania, Thailand, Timor, Togo, Tonga, Trinidad and Tobago, Tunisia, Turkey, Uganda, Ukraine, Uruguay, Uzbekistan, Vanuatu, Vietnam, Yemen, Zambia, Zimbabwe.

Task 2: Refreshing your memory on descriptive statistics

One of the variables of main interest in the dataset is `wb_majFemOwned_mr`: each observation represents the share of firms with an absolute majority of female proprietorship across countries, using the most recent observations available. The second available, which is object of the analysis in this paragraph, is `Discriminationinthefamily_mr`: it is the SIGI index for the level of discrimination in the family using the most recent observations available for each country in the dataset.

The mean of `wb_majFemOwned_mr` is equal to 0.211 and its standard deviation is equal to 20.91 (Table 1): it means that on average, from the most recent observations, only 21.1% of firms have an absolute majority of female proprietorship across countries. The value of the standard deviation shows the level of dispersion of the observations: having a high value for

standard deviation of the rate of female entrepreneurship, means that the rate is not heterogeneous across the globe. Another interesting indicator is the Skewness index: having a positive and low value means that observations are concentrated on the left side of the distribution: it means that the majority of firms have not female proprietorship. What we can expect from further examination is that in poorer countries the value of `wb_majFemOwned_mr` is going to be lower, due to different factors such as gender norms, rule of law, weak institutions, etc.

One of the explanations for low rate of female entrepreneurship could be the level of discrimination in the family, which is based on laws on child marriage, household responsibilities, inheritance, and divorce. The mean in the dataset of the variable `Discriminationinthefamily_mr` is 44.022 and its standard deviation is 20.91 (Table 1). The indicator ranges from 0 to 100, which means that on average discrimination in the family is almost half of the total score. Standard deviation is high, which means that there is heterogeneity across the world. So, we can expect that in developing countries this value is going to be higher.

Task 3: correlation matrices

The SIGI Physical Integrity Index (`Restrictedphysintegrity_mr`) includes laws on violence against women and reproductive autonomy, attitudes towards and prevalence of female genital mutilation (FGM) and domestic violence, missing women, and access to family planning (most recent observations).

The correlation between `Discriminationinthefamily_mr` and `Restrictedphysintegrity_mr` is equal to 0.2491 (Table 2): it means that there is a positive relation between the level of discrimination in the family and the physical integrity of women. Correlation means that the two variables change together, and not necessarily that there is a cause-effect significance. They are both measures of the protection laws for women, and it seems reasonable that in countries where there is lower reinforcement of women's right concerning the household there will be lower reinforcement of women's rights concerning violence, and vice versa.

Task 4: bar graphs

The final outputs differ from the ones in the Ashraf et al. paper due to having a higher number of observations.

Figure 1 shows the share of firms with an absolute majority of female proprietorship across countries, using the most recent observations available. The red line represents the median value for the variable considered (`wb_majFemOwned_mr`), which is equal to 0.19507. It means that in the countries considered less than 20% of the businesses are female-led. As we expected, the countries in which this rate is lower are developing countries, such as Bangladesh, Pakistan, Nigeria, etc.

Figure 2 shows the WB rule of law index across countries. When rule of law is low, women's contracting power is significantly lower, exacerbating asymmetric information and men's power in controlling them. So, in countries that have very weak rule of law, it is likely that women's entrepreneurship is extremely discouraged.

The countries included in the dataset have such low values that the median is equal to -0.4433655. Having a negative value for this index could mean that law disincentivizes the entrance of women in business.

Once again, the countries having the lowest values for `rulelaw_mr` are developing countries, such as India, Zimbabwe, Cambodia, etc.

Task 5: Scatter plots

The scatterplot in Figure 3 shows the linear correlation between the level of discrimination in the family (measured by the SIGI index) and the share of firms with an absolute majority of female proprietorship. As we could have expected, the relation between discrimination in the family and female entrepreneurship is negative: in countries with women marginalization within the household, the share of businesses owned for the majority by women is lower.

Further specification of the linear model can be observed in the regression parameters from Table 3. The effect of discrimination on female entrepreneurship is measured by the coefficient equal to -0.0032: discrimination has indeed a negative effect on female. But the absolute value of the coefficient seems to be lower than expectations: this could be explained by the tendency of women of entering predominantly female sectors, such as apparel and food production. This condition would bias downward (in absolute value) the effect of female discrimination inside the household on women's proprietorships of businesses.

Figure 4 displays the quadratic relationship measuring, once again, the effect of discrimination in the family on share of businesses owned by omen. The concave curve shows the negative effect: the higher the discrimination, the lower the female entrepreneurship. Table 4 shows the coefficients of the quadratic regression: they are both negative, but they are not statistically significant, even though the quadratic model may be better at capturing the dispersion of the observations.

The relation between the WJP index, which is an index for rule of law as measured by the World Justice Project, and female entrepreneurship is illustrated in figure 5. The prediction line has positive slope, which means that better rule of law has positive impact on the share of firms owned for the majority by women.

They grey area represents the confidence intervals: it means that there is a 95% chance that the true best-fit of the linear prediction lies within the confidence interval. The narrower the area, the more precise the estimate: in the figure one can observe that the prediction line is better at capturing the fit for values at the center and is less precise for values corresponding to the tails of the line. That is because there is higher dispersion around the extremities. In fact, there is more heterogeneity between countries in the left extremity: poorer countries, which correspond to countries that have worse rule of law, present intrinsic differences from those in the opposite side.

Stronger institutions and law for the protection of women are fundamental elements to create an incentivizing environment for the entrance of women even in sectors typically dominated by men. But Table 6 shows that this positive effect: rule of law is not enough, it is also necessary take into account gender norms, which are typically the main reason for which women are not allowed to have independence.

Task 6: Multiple entries table

Table 6 represents the number of countries according to the index for rule of law (rows) and the index for restricted physical integrity (columns). The dataset has a total of 117 observations, as we had to exclude observations having missing values for either variable rulelaw_mr or Restrictedphysintegrity_mr, or for both.

There is a higher number of countries having high value for rule of law (63) and low values for restricted integrity (60), respectively corresponding to the 53.85% and 51.28% of the whole dataset. But the majority of the observations (35) have both high values of rule of law and high values for restricted integrity, representing the 32.84% of the dataset. It seems contradicting that countries that have high rule of law, so a strong institution and norms background, will also present more restrictions towards the independence of women. But, from previous knowledge, we know that having good rule of law is not enough to guarantee, for example, the free movement of women or to protect women from violence, which are two of the indicators considered while building the SIGI index for restricted physical integrity. Rule of law are complementary to gender norms, and as long as there is no change in the perception of women liberties, there is no way their entrepreneurship will be incentivized. Moreover, the index for restricted physical integrity is a combination of different elements such as laws on violence against women and reproductive autonomy, so it seems like that even though there is good rule of law, it actually does not concern women.

Task 7: Creating a percentile variable

Countries can be classified according to the different indices considered in the analysis, creating a sort of clusterization of the sample. For example, there can be created categories according to the share of manufacturing firms owned for the majority, in absolute value, by women. The countries are divided in 8 different percentile. Each of the group contains countries belonging to different percentiles of the `majFemOwned_manuf_mr` variable as follows:

- group 1 (12.5th percentile): `majFemOwned_manuf_mr` $\in [0,\ 0.0580401]$,
- group 2 (25th percentile): `majFemOwned_manuf_mr` $\in (0.0580401, 0.1]$,
- group 3 (37.5th percentile): `majFemOwned_manuf_mr` $\in (0.1, 0.1372549]$,
- group 4 (50th percentile): `majFemOwned_manuf_mr` $\in (0.1372549,\ 0.18]$,
- group 5 (62.5th percentile): `majFemOwned_manuf_mr` $\in (0.18, 0.2228412]$,
- group 6 (75th percentile): `majFemOwned_manuf_mr` $\in (0.2228412, 0.2673378]$,
- group 7 (87.5th percentile): `majFemOwned_manuf_mr` $\in (0.2673378, 0.35]$,
- group 8 (100th percentile): `majFemOwned_manuf_mr` $\in (0.35, 0.6153846]$.

By considering 8-percentile, each group contains 14 countries.

Specifically, Italy belongs to group 2 and Zambia belongs to group 6: Italy has a very low share of female-led manufacturing businesses as the percentage of female proprietorship in this sector is between 5.8% and 10%, while in Zambia there is a slightly higher share, which qincluded between 22.3% and 26.7%.

Task 8: Regression analysis

Table 2 shows the results for different regression analyses. Column (2) looks at the impact of Rule of law and of the SIGI index for discrimination in the family; columns (4) and (5) replace the second variable with the measure of for violence against women.

Looking at all the results, we can infer that Rule of law has a low effect on female entrepreneurship, when discrimination in the family and violence against women are common. While, low values for the measures of discrimination in the family and of violence against wives in each model have a very big impact on the dependent variable, and they also have good levels of significance.

The interaction terms seem to mitigate the positive effect of low levels of discrimination and violence, but their coefficients either have no significance or it is very low. These results are

very different from the ones reached by Ashraf et al. in the original paper, as they have positive sign. From the results reached in our replication, we see that the interaction is not relevant and this could mean that regulating gender norms or changing misperception may be even more important and impactful than creating new laws or intervening with certain policy programs. From the original paper, instead we see that when gender norms boost female entrepreneurship when there is good rule of law.

Finally, GDP coefficients have positive signs, it is common knowledge that economic growth creates a more motivating environment for entrepreneurship and specifically for women entering markets. But these values are very low and have no significance: that is because growth alone has no effect, if the context, composed by institutions, law, norms an biases, is not adequate for providing the necessary support for women businesses.

Appendix

Table 1: Summary statistics

Variables	Obs	Mean	Std. Dev.	Min	Max	p1	p99	Skew.	Kurt.
wb majFemOwned mr	112	.211	.125	0	.593	.012	.55	.675	3.283
Discriminationin~ mr	132	44.022	20.91	.56	89.9	9.6	89.7	.689	2.573

Table 2: Correlation matrix

	Discrimination ~g	Discrimination ~mr	Discrimination ~ymr	Discrimination ~frs	Discrimination ~yfrs	Restricted ~g	Restricted ~mr	Restricted ~ymr	Restricted ~frs.	Restricted ~yfrs
Discrimination ~g	1.000									
Discrimination~mr	0.9354	1.000								
Discrimination ~ymr	0.1908	0.1959	1.000							
Discrimination ~frs	0.3315	-0.0236	0.0168	1.000						
Discrimination ~yfrs	0.2809	-0.0669	0.0196	0.9726	1.000					
Restricted ~g	0.3143	0.1785	-0.0636	0.4123	0.3766	1.000				
Restricted ~mr	0.2771	0.2491	-0.0846	0.1188	0.0917	0.9092	1.000			
Restricted ~ymr	-0.1483	-0.1848	-0.0356	0.0739	0.0810	0.5687	0.6062	1.000		
Restricted ~frs	0.1762	-0.0902	0.0236	0.7388	0.7097	0.5032	0.0976	0.1011	1.000	
Restricted ~yfrs	-0.0097	-0.1900	0.0314	0.4796	0.4857	0.2508	-0.1013	0.1296	0.8095	1.000

Table 3: Female ownership and family discrimination (linear)

	wb_majFemOwned_mr
Discriminationinthe family_mr	-0.00322***
	(-6.63)
_cons	0.358***
	(14.71)
N	111

t statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 4: Female ownership and family discrimination (quadratic)

	wb_majFemOwned_mr
Discriminationinthe family_mr	0.000738
	(0.32)
Discriminationinthe family_mr2	-0.0000379
	(-1,73)
_cons	0.273***
	(5.00)
N	111

t statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 5: Female ownership and WJP index

	wb_majFemOwned_mr
wjp_index_new_mr	0.141
	(0.98)
_cons	0.146*
	(1.99)
N	83

t statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 6: Number of countries by rule of law and restricted physical integrity

			Restricted physical integrity		
			Low	*High*	
Rule of law	*Low*	Frequency	25	38	63
		Percent	21.37	32.48	53.85
	High	Frequency	35	19	54
		Percent	29.91	16.24	46.15
	Total	Frequency	60	57	117
		Percent	51.28	48.72	100.00

Table 7: Interaction between Rule of Law and Female Bargaining Power across Countries

	Female ownership		
	(2)	(4)	(5)
Rule of law > med	0.0126	0.0638	0.0532
	(0.37)	(1.18)	(1.01)
Discrim in the family < med	0.137***		
	(4.46)		
Rule of law > med x	-0.0588		
Discrim in the family < med	(-1.29)		
Violence on wives < med		0.143**	0.138**
		(2.74)	(2.72)
Rule of law > med x		-0.142	-0.180*
Violence on wives < med		(-1.88)	(2.35)
Log gdp pp (2011)	0.00641		0.0388
	(0.59)		(0.192)
constant	0.107	0.160***	-0.141
	(1.32)	(5.05)	(-0.88)
N	111	51	51
R-squared	0.2170	0.1395	0.2031

t statistics in parentheses
$p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Figure 1: Female owned firms across countries

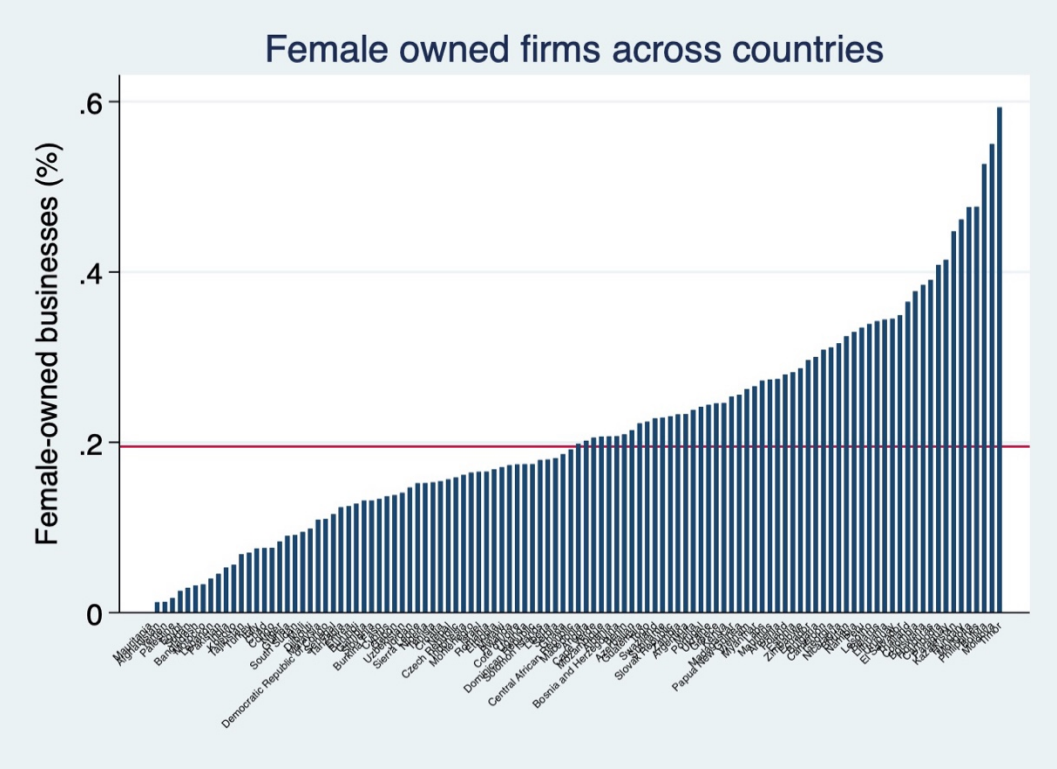

Figure 2: WB rule of law index across countries

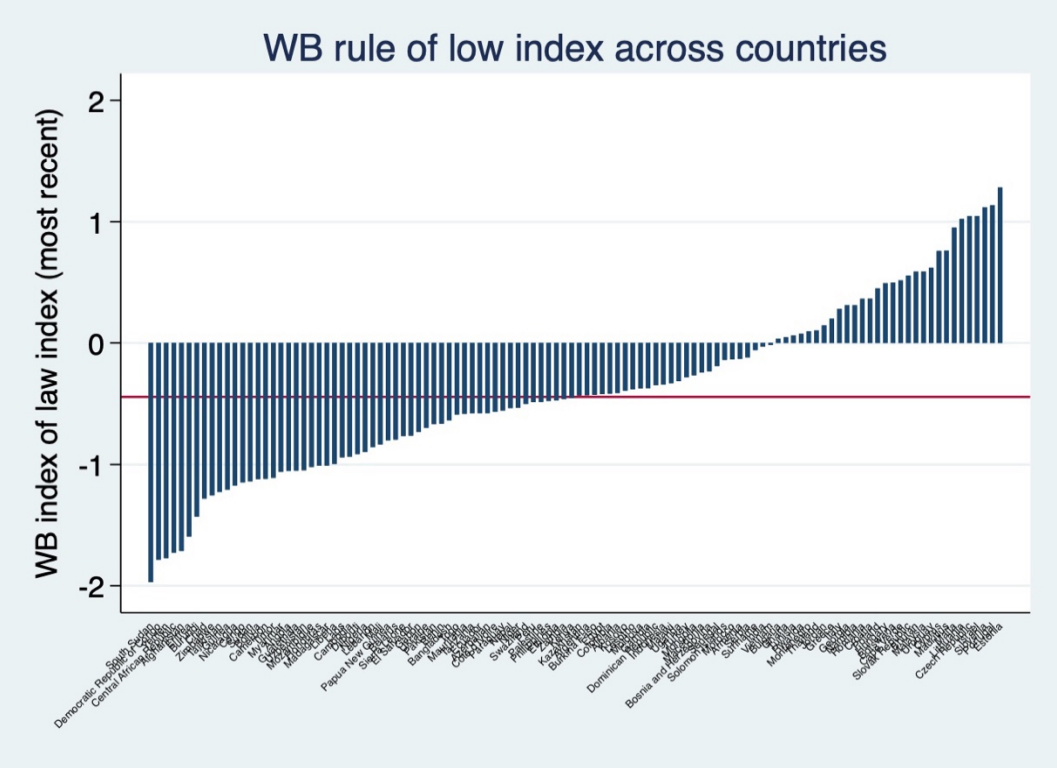

Figure 3: Female business ownership and family discrimination (linear)

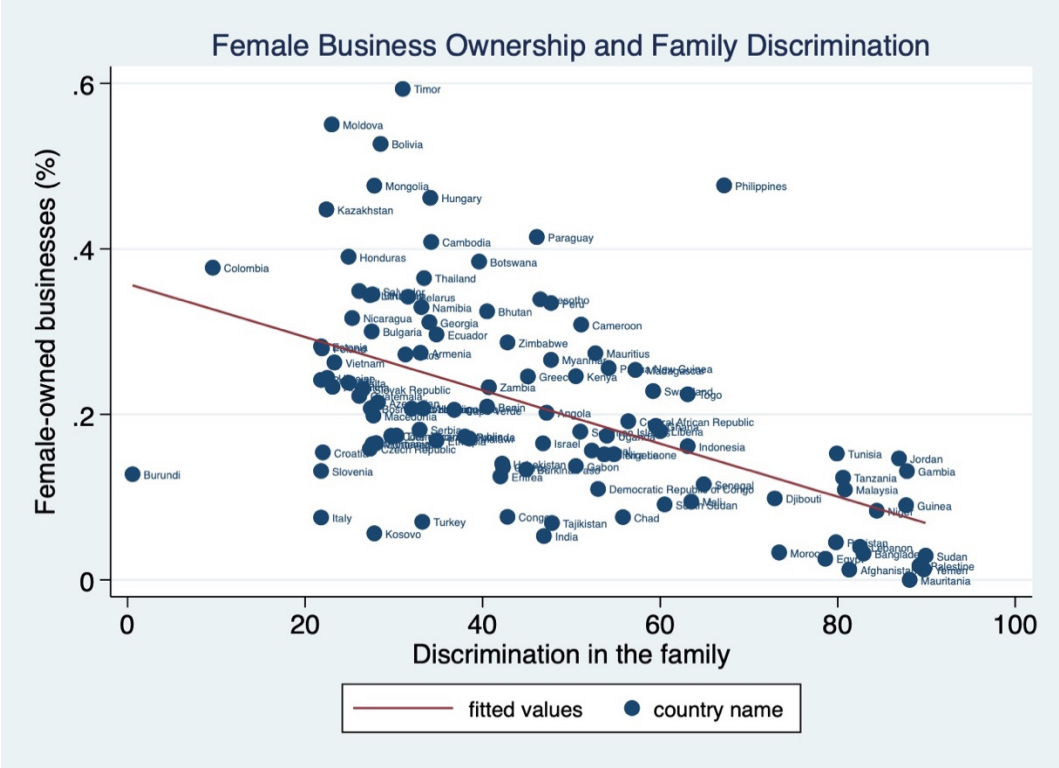

Figure 4: female business ownership and family discrimination (quadratic)

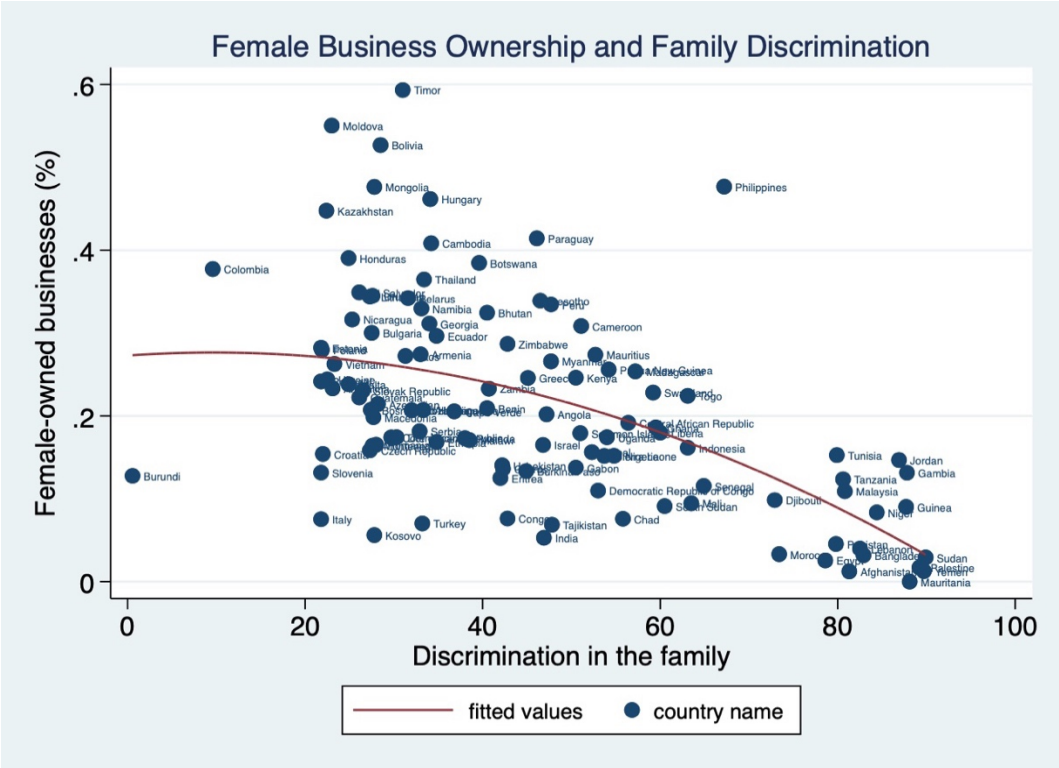

Figure 5: Female business ownership and WJP score