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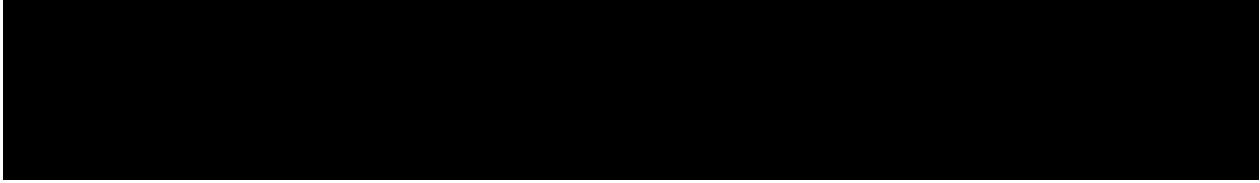


# Economic Freedom and Female Entrepreneurship

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Abstract



However, there are notable exceptions, such as Elam and Terjesen and Amorós (2010) and Verheul et al. (2006), who have explored the differences in female and male entrepreneurship using samples from 11 and 29 countries, respectively. A logical starting point is to examine disparities in levels of development and the quality and capacity of institutions. It is widely acknowledged that levels of entrepreneurship vary in accordance with GDP per capita (Wennekers et al., 2005). Furthermore, Minniti (2010) spec1 0 0 1 351.19 655.66 Tm0 g0 G(nt is)-3( to exa)-6(mine d)7(is)-505). Furthermore,



employed a matching method to explore the exogenous effect of economic freedom on female entrepreneurship. Using the Economic Freedom of the World Index by the Fraser Institute, this study defines the treatment as a meaningful and sustained increase in the Index. It uses the Global Entrepreneurship Monitor (GEM) data as a measure of female entrepreneurship.

The initial findings indicate that a significant and lasting increase in economic freedom has a positive impact on female entrepreneurial activities in the long term. It also fosters opportunity-driven entrepreneurship among females. However, two factors that may have a negative influence on female's entrepreneurship are the size of the government and regulatory measures. These findings suggest that while economic freedom can benefit female's entrepreneurial endeavors, certain aspects, such as government size and regulatory constraints, may pose challenges.

The study proceeds as follows. It discusses the methodology in Section 2. Results from the matching method are reported in section 3. Section 4 concludes.

## 2. Methodology

The study outlines its methodology in six steps. Firstly, it provides an overview of the data structure employed in the analysis. Subsequently, it discusses the matching method utilized in the study. Next, the study defines the treatment variable being examined and the process of generating the outcome variable. The study also provides a detailed description of the covariates considered in the analysis. Lastly, the methodology includes a description of the counterfactual units that were examined.

### *2.1. Data Structure*

The objective of this study is to determine the causal relationship between economic freedom and female entrepreneurship. The data used for assessing economic freedom is derived from the Fraser Institute's Index of Economic Freedom of the World, spanning the years 1970 to 2020. On the other hand, the data on female entrepreneurship is obtained from the Global Entrepreneurship



bias. Furthermore, Goodman-Bacon (2021) argues that TWFE can generate estimates with an opposite sign. Therefore, alternative causal methods such as synthetic control or matching techniques are more suitable in scenarios where treatments occur at different times. However, this study is unable to utilize the synthetic control method due to the unavailability of the outcome variable for a sufficient number of consecutive time periods before and after the treatment. Instead, this study employs a matching technique, which offers flexibility in selecting control units that are independent of treated units. This method allows for establishing a causal relationship between economic freedom and female entrepreneurship while minimizing potential biases.

In this study, meaningful and sustained increases in the Economic Freedom of the World (EFW) index are observed. These increases are particularly notable in countries that have implemented significant reforms to improve economic freedom. The study finds that these reforms lead to a positive and significant impact on female entrepreneurship, suggesting that economic freedom is a key driver of women's economic participation. The findings are robust to various sensitivity tests, including placebo tests and tests for common trends. The results are also consistent across different subsamples, including countries with different levels of economic development and different regions. The study's findings have important implications for policymakers and researchers alike. They suggest that promoting economic freedom is a crucial strategy for improving the economic status of women and fostering sustainable economic growth. Further research is needed to explore the underlying mechanisms through which economic freedom influences female entrepreneurship and to identify the most effective policies for promoting women's economic participation.



(2017) argue that examining the effects on the difference in outcome helps eliminate the influence of time-invariant factors. By focusing on the difference in outcomes between the treated and untreated units, the study seeks to isolate the causal impact of the treatment.





The second sub-category measures the legal system and property rights, which evaluates a country's protection of individuals and their rightfully acquired property. The components used to construct this measure include judicial independence, impartial courts, protection of property rights, military interference in the rule of law and politics, integrity of the legal system, legal enforcement of contracts, regulatory costs of the sale of real property, reliability of the police, business costs of crime, and adjustment for gender disparity.

The third sub-category measures the soundness of a country's monetary system. The components considered in constructing this measure include money growth, standard deviation of inflation, inflation in the most recent year, and freedom to own foreign currency bank accounts. The fourth sub-category assesses the freedom to trade internationally, considering various restraints that impact on international exchange. The components used in constructing this measure include tariffs, regulatory trade barriers, black-market exchange rates, and controls on the movement of capital and people. The fifth sub-category examines regulatory restraints that limit freedom in credit, labor, and product markets. The components used in constructing this measure include credit market regulations, labor market regulations, and business regulations.

The study provides a summary of each sub-index in table 2, including the components considered and their respective weights. The treatment definitions for each sub-category are similar to the overall EFW measure, but the specific jump in score and sustained score requirements may differ based on the average and standard deviation values for each sub-category, as shown in table 2. This allows for a nuanced analysis of the treatment effects within each sub-category. The number of treated units for each sub-category is presented in table 3, providing insights into the sample distribution and the availability of data for each treatment definition.

#### *2.4. Outcome Variable*

The outcome variable utilized in this study is derived from the Global Entrepreneurship Monitor (GEM) data, specifically from the Behavior and Attitudes and Framework and Conditions datasets. Two measures are employed from the behavior and attitude dataset: i) the female to male ratio in Total Early-Stage Entrepreneurial Activity (TEA), and ii) the female to male ratio in opportunity-driven Total Early-Stage Entrepreneurial Activity (OTEA).

The first variable measures the percentage of females aged 18-64 who are either nascent entrepreneurs or owner-managers of a 'new business', divided by the equivalent percentage for their male counterparts. This variable is available from 2001 to 2022. The second variable measures the percentage of females involved in TEA who are driven by opportunity rather than necessity, and



10, with the lowest and highest scores indicating hereditary monarchy and consolidated democracy, respectively.

The variables constructed for this study align with the matching method employed. Thus, the set of covariates includes the 5-year lagged logarithm of GDP per capita, 5-year lagged population growth, 5-year lagged Human Capital Index, 5-year lagged polity, 5-year lagged share of consumption at current purchasing power parities (PPP), 5-year lagged share of gross capital formation at current PPPs, 5-year lagged share of government consumption at current PPPs, and 5-year lagged EFW score. All these variables are averaged over the period 1995-2004. Summary statistics for all variables are presented in table 3, providing an overview of their distribution and characteristics.

### *2.6. Determining Counterfactual*

Constructing an appropriate counterfactual group is indeed crucial in the matching model. In this study, the counterfactual units are restricted to include only countries that did not receive any treatment throughout the entire analysis period. This helps ensure a valid comparison between the treated and control units.

For the matching model, a treated unit is compared with a control unit that did not receive any treatment prior to the year 2005, as specified in this analysis. However, it is important to note that some countries that did not receive treatment during the period of 1995-2005 may have received treatment after 2005. Including these countries as control units could contaminate the estimated treatment effect on the outcomes, as their future treatment status may influence the results.

To construct the control units for the treatment, this study initially removes all observations for countries that experienced any treatment from 2004 to 2020. By doing so, the focus is solely on untreated units during the specified period. Following a similar approach, the study identifies control

units for all treatment types under each treatment definition, ensuring that the control group consists only of untreated units. The number of untreated units and the dropped units for each treatment are listed in table 2, providing insights into the sample distribution and the treatment status of the countries.

### 3. Results

This section of the study focuses on presenting the results in two distinct steps. First, it provides the baseline results derived from the analysis of the impact of economic reform on female entrepreneurial activities. This analysis examines the relationship between economic reform and female entrepreneurship using a specific set of covariates and treatment definitions. The findings from this baseline analysis serve as the foundation for assessing the relationship. Second, the study conducts robustness checks to verify the reliability and stability of the initial findings.

Two approaches are employed for these robustness checks. The first approach involves testing different covariate sets. By altering the selection of covariates, the study evaluates whether the results remain consistent and reliable across different sets of variables. This helps assess the robustness of the initial findings and ensures that the observed impact of economic reform on female entrepreneurship is not solely driven by a specific set of covariates. The second approach examines the impact of different treatment definitions. By varying the definition of treatment, the study explores whether the observed effects are consistent and robust under different specifications. This analysis allows for a comprehensive assessment of the relationship between economic reform and female entrepreneurship.

#### *3.1. Baseline Model*

The analysis begins with logit estimations of the probability of receiving treatments, and the results are presented in table 4. The first column displays the estimations for each covariate, which are used



to calculate the propensity scores for the observations. The second column shows the standard deviation for each covariate. The logit estimation reveals that none of the covariates are statistically significant, except for the lagged economic freedom index. However, when examining the covariate balance in table 5, it is evident that the treated units and the matched counterfactual units exhibit reasonably similar covariate values.

The main results of the analysis are presented in table 6. This table displays the average treatment effects on three outcome variables. Column 1 presents the average treatment effect on 5-year growth in Total Early-Stage Entrepreneurial Activity (TEA), column 2 presents the average treatment effect on 10-year growth in TEA, and column 3 presents the average treatment effect on 3-year growth in opportunity-driven Total Early-Stage Entrepreneurial Activity (OTEA). The estimates are based on four types of propensity score matching and three types of Mahalanobis matching.

The results consistently indicate a negative impact, although not statistically significant, on 5-year growth in TEA due to sustained economic reform (table 6, column 1). This suggests that in the short run, economic freedom does not have a significant

significant estimates. Although the outcome variable represents the growth over a 3-year period, the difference in values starts from 2013, making it a long-term outcome. The large and sustained increase in economic freedom enhances opportunities for females in opportunity-driven entrepreneurship by an average of 0.040 points (more than one standard deviation) in the long run.

The interpretation of the results suggests that economic reform initially benefits both male and female individuals equally. However, it appears to encourage females more in the long run. Not only does economic reform increase necessity entrepreneurship among females, but it also promotes their engagement in opportunity-driven and high-quality entrepreneurship.

### *3.2.1. Robustness Checks: Different Covariates Sets*

In this section, different covariate sets are used to estimate the models, while the treatment and

The third covariate set includes the 5-year lagged log of GDP Per Capita, 5-year lagged Polity, 5-year lagged Human Capital Index, 5-year lagged EFW, 5-year lagged Share of government consumption, exports, and imports at current PPPs. The results obtained with this covariate set align closely with the baseline results (table 9). The study has also analyzed the results using different sets of covariates which includes ethnic fractionalization from Alesina et al. (2003), Political Risk Services (PRS) corruption index from International Country Risk Guide (ICRG, 2017), political rights and civil liberties come from Freedom House data (2014). The results are presented in appendix table A1-A3. Overall, the results from the different covariate sets show some variation but generally support the findings of the baseline models. This suggests that the impact of economic reform on female entrepreneurship remains consistent across different covariate specifications, reinforcing the robustness of the findings.

### *3.2.2. Robustness Checks: Effect of Sub-Components of EFW*

In this section, the impact of reform in the sub-categories of the overall EFW index is explored (tables 10-15), following a similar approach as the baseline treatment. The covariate set and outcome variables remain consistent with the baseline model.

The first treatment examines the reform in government size. The results indicate that a reform aimed at reducing the size of the government negatively affects 5-year and 10-year growth in both TEA and OTEA ratios (table 10). Although the estimates for TEA are not statistically significant, the study finds negative and significant estimates for the OTEA ratio. This suggests that a smaller government size may have a detrimental effect on female's entrepreneurship. This finding aligns with the existing literature, which suggests that females may require more government support to engage in entrepreneurial activities.

The second treatment investigates the reform in the gender disparity index (GDI) (table 11). The results show mixed findings across all outcome measures. The limited number of treatment units for this specific reform may contribute to the difficulty in finding statistically significant results.

The third treatment focuses on the reform in the legal system and property rights (table 12). The model does not reveal any significant impact on either outcome variable. However, the results in Table 13 demonstrate a significant positive impact on long-term growth in the TEA ratio for the reform in sound money. This implies that a substantial and sustained increase in the measure of sound money benefits females in the long run, fostering their engagement in entrepreneurial activities. Defining the sound money treatment with higher increase (1.5 points and 0.2 points sustained), the results stay similar (Appendix table A4).

The treatment related to the reform of freedom to trade internationally shows no significant impact on the outcome variables (table 14). Finally, the treatment regarding the reform in regulation is examined (table 15). The results suggest that regulation reform initially benefits females in the short run but discourages them from engaging in opportunity-driven entrepreneurship. This finding aligns with the hypothesis discussed in the study, where men tend to utilize social networks and informal channels more effectively in dealing with government and regulations. Consequently, relaxation of regulations may facilitate females in establishing a business in the initial stages, but in the long run and in high-quality entrepreneurship, men tend to benefit more compared to their female counterparts.

### *3.2.3. Robustness Checks: Defining Outcome Variable*

In this section, the outcome variable, growth is defined by the root of sum of the outcome variables over the years. After taking the root of the sums for two time periods, we take the difference in the measures to generate the growth variable. This outcome variable shows similar results (Appendix table A5) as the baseline model, when observing the effect of sustained increase

in economic freedom. Further, the study also explores the impact of the economic reform on the newly generated outcome variable for the countries with higher Gender Disparity Index (GDI) (greater than mean of 0.76). For the availability of data, the study is unable to measure the impact for countries with lower level of Gender Disparity Index (GDI). The results (Appendix table A6

increase in the EFW measure between 1995 and 2000 are identified as treatment units. The average short-term and long-term growth in the TEA ratio is used as the outcome measure.

The most robust finding of the study suggests that economic reform has either no impact or a negative impact on the 5-year growth in the TEA ratio. In other words, economic reform does not immediately facilitate female entrepreneurial activities. However, in the long run, it benefits females by reducing the gender gap in entrepreneurial activities and promoting opportunity-driven entrepreneurship. The key components that positively influence female's entrepreneurship are a larger government and sound money. On the other hand, reform in regulations initially benefits females, however, it

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## TABLES

TABLE 1: Summary Statistics of Economic Freedom of the World (EFW) Measures

Variable	Obs	Mean	Std. Dev.	Min	Max
Economic Freedom of the World (EFW)	130	6.59	1.07	3.43	8.87

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TABLE 3: Summary Statistics of Outcome Variables and Covariates

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Variable	Obs	Mean	Std.	Min	Max
<i>Outcome Variable</i>					
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TABLE 5: Covariate Balance Achieved by Matching

Unmatched

Mean

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TABLE 7: Effects of Economic Freedom on average growth of Female Entrepreneurship (Treatment: a sustained increase in overall Economic Freedom of the World) (New Covariate Set 1)

	Female/Male TEA		Female/Male
	5-year growth	10-year growth	Opportunity-Driven TEA
			3-year growth
Propensity Score: Nearest Neighbor	-.018*	.003	.030
Propensity Score: Nearest 2 Neighbors	-.009	.003	.011
Propensity Score: Nearest 3 Neighbors	-.011	-.001	.013
Propensity Score: Normal Kernel	-.013	-.000	.017
Mahalanobis: Nearest Neighbor	-.008	.007	.010
Mahalanobis: Nearest 2 Neighbors	-.001	.014**	.022
Mahalanobis: Nearest 3 Neighbors	-.001	.013*	.022

Notes: \*\*\*, \*\*, & \* indicate significance at the .01, .05, and .10 levels, respectively. Bootstrapped standard errors are in parentheses using 200 replications for propensity score matching only.

TABLE 8: Effects of Economic Freedom on average growth of Female Entrepreneurship (Treatment: a sustained increase in overall Economic Freedom of the World) (New Covariate Set 2)

	Female/Male TEA	Female/Male
5-year growth		Opportunity-Driven TEA

TABLE 9: Effects of Economic Freedom on average growth of Female Entrepreneurship (Treatment: a sustained increase in overall Economic Freedom of the World) (New Covariate Set 3)

Female/Male TEA		Female/Male Opportunity-Driven TEA
5-year growth	10-year growth	3-year growth

TABLE



TABLE 13: Effects of Economic Freedom on average growth of Female Entrepreneurship (Treatment: a sustained increase in Sound Money Measure of EFW)

	Female/Male TEA	Female/Male Opportunity-Driven TEA
5-year growth	10-	

TABLE 15: Effects of Economic Freedom on average growth of Female Entrepreneurship (Treatment: a sustained increase in Regulation Measure of EFW)

	Female/Male TEA		Female/Male Opportunity-Driven TEA
	5-year growth	10-year growth	3-year growth
Propensity Score: Nearest Neighbor	-0.001	-0.002	-0.026

## Appendix A

Table A3: Effects of Economic Freedom on average growth of Female Entrepreneurship (Treatment: a sustained increase in overall Economic Freedom of the World)

	Female/Male TEA		Female/Male
	5-year growth	10-year growth	Opportunity-Driven TEA
			3-year growth
Propensity Score: Nearest Neighbor	-.013	.009	.010
Propensity Score: Nearest 2 Neighbors	-.010	.007	-.006
Propensity Score: Nearest 3 Neighbors	-.011	.004	-.007
Propensity Score: Normal Kernel	-.012	.005	-.004
Mahalanobis: Nearest Neighbor	-.002	.012*	.046**
Mahalanobis: Nearest 2 Neighbors	-.003	.006	.035**
Mahalanobis: Nearest 3 Neighbors	-.006	-.00007	.036**

Notes: \*\*\*, \*\*, & \* indicate significance at the .01, .05, and .10 levels, respectively. Bootstrapped standard errors are in parentheses using 200 replications for propensity score matching only.

Covariates: I5\_lngdppc I5\_polity I5\_efw I5\_hc ethnic I5\_corr

5-year lagged log of GDP Per Capita, 5-year lagged Polity, 5-year lagged Human Capital Index, 5-year lagged EFW, Ethnic fractionalization and 5-year lagged Corruption index.

Table A4: Effects of Economic Freedom on average growth of Female Entrepreneurship (Treatment: a (Higher increase of 1.5 points increase with 0.2 points sustained) sustained increase in Sound Money Measure of EFW)

	Female/Male TEA		Female/Male
	5-year growth	10-year growth	Opportunity-Driven TEA
			3-year growth
Propensity Score: Nearest Neighbor	-.005	.005	.005
Propensity Score: Nearest 2 Neighbors	-.001	.004	-.011
Propensity Score: Nearest 3 Neighbors	.001	.005	.0001
Propensity Score: Normal Kernel	-.003	.004	.002
Mahalanobis: Nearest Neighbor	.004	.005	-.024
Mahalanobis: Nearest 2 Neighbors	.006	.011**	-.039***
Mahalanobis: Nearest 3 Neighbors	.006	.011**	-.048***

Notes: \*\*\*, \*\*, & \* indicate significance at the .01, .05, and .10 levels, respectively. Bootstrapped standard errors are in parentheses using 200 replications for propensity score matching only.

Table A5: Effects of Economic Freedom on average growth of Female Entrepreneurship (Treatment: a sustained increase in overall Economic Freedom of the World) (Second definition for the measures of outcome variable)

	Female/Male TEA		Female/Male
	5-year growth	10-year growth	Opportunity-Driven TEA
			3-year growth
Propensity Score: Nearest Neighbor	.014	.009	-.046
Propensity Score: Nearest 2 Neighbors	.006	.008	-.048
Propensity Score: Nearest 3 Neighbors	.005	.009	-.085
Propensity Score: Normal Kernel	.025	.023	-.066
Mahalanobis: Nearest Neighbor	-.034*	.021*	.025
Mahalanobis: Nearest 2 Neighbors	-.033	.025**	-.004
Mahalanobis: Nearest 3 Neighbors	-.034*	.010	-.008

Notes: \*\*\*, \*\*, & \* indicate significance at the .01, .05, and .10 levels, respectively. Bootstrapped standard errors are in parentheses using 200 replications for propensity score matching only.

Table A6: Effects of Economic Freedom on average growth of Female Entrepreneurship (Treatment: a sustained increase in overall Economic Freedom of the World (EFW) (Second definition for the measures of outcome variable) (countries with High GDI Measure pre-treatment)

	Female/Male TEA		Female/Male
	5-year growth	10-year growth	Opportunity-Driven TEA
			3-year growth
Propensity Score: Nearest Neighbor	.033	.008	-.057
Propensity Score: Nearest 2 Neighbors	.038	.002	-.048
Propensity Score: Nearest 3 Neighbors	.040	.001	-.052
Propensity Score: Normal Kernel	.034	.003	-.062
Mahalanobis: Nearest Neighbor	.001	-.003	.116**
Mahalanobis: Nearest 2 Neighbors	-.001	-.003	.096**
Mahalanobis: Nearest 3 Neighbors	.012	-.004	.080**

Notes: \*\*\*, \*\*, & \* indicate significance at the .01, .05, and .10 levels, respectively. Bootstrapped standard errors are in parentheses using 200 replications for propensity score matching only.